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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

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SEBU7781-02
November 2009

Operation and Maintenance Manual

914G Wheel Loader and IT14G Integrated Toolcarrier

PDF1-Up (914G)
FWL1-Up (IT14G)
KZN1-Up (IT14G)

i03661280

Maintenance Interval Schedule

SMCS Code: 7000

Ensure that all safety information, warnings and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance, including all adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance.

Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

Note: If Cat HYDO Advanced 10 hydraulic oil is used, the hydraulic oil change interval is extended to 3000 hours. S·O·S services may extend the oil change even longer. Consult your Caterpillar dealer for details.

When Required

Battery or Battery Cable - Inspect/Replace 89
Bucket Cutting Edges - Inspect/Replace 92
Bucket Tips - Inspect/Replace 94
Bucket Wear Plates - Inspect/Replace 96
Circuit Breakers - Reset 97
Engine Air Filter Primary Element - Clean/ Replace 103
Engine Air Filter Secondary Element - Replace .. 106
Engine Air Precleaner - Clean 107
Fuel Tank Water and Sediment - Drain 113
Fuses - Replace 113
Oil Filter - Inspect 119
Radiator Core - Clean 120
Ride Control Accumulator - Check 121
Windows - Clean 125
Windshield Washer Reservoir - Fill 125
Windshield Wipers - Inspect/Replace 126

Every 10 Service Hours or Daily

Backup Alarm - Test 88
Cab Air Filter - Clean/Replace 96
Cooling System Coolant Level - Check 99
Engine Air Filter Service Indicator - Inspect 106
Engine Air Filter Service Indicator - Inspect/Replace 107
Engine Oil Level - Check 108
Hydraulic System Oil Level - Check 115
Seat Belt - Inspect 122
Tire Inflation - Check 125

Every 50 Service Hours or Weekly

Bucket Linkage and Loader Cylinder Bearings - Lubricate 92
Bucket Pivot Bearings - Lubricate 93
Fuel System Filter and Water Separator - Drain .. 111
Quick Coupler - Lubricate 120

Every 100 Service Hours or 2 Weeks

Articulation Bearings - Lubricate 88
Axle Oscillation Bearings - Lubricate 88
Steering Cylinder Bearings - Lubricate 123

Every 250 Service Hours

Engine Oil Sample - Obtain 108

Every 250 Service Hours or Monthly

Battery - Clean 89
Belts - Inspect/Adjust/Replace 90
Brake Accumulator - Check 91
Braking System - Test 92
Differential and Final Drive Oil Level - Check 102
Drive Shaft Spline (Center) - Lubricate 103
Hydrostatic Drive Oil Level - Check 117

Every 250 Service Hours or 3 Months

Steering Column Play - Check 123

Initial 500 Hours (for New Systems, Refilled Systems, and Converted Systems)

Cooling System Coolant Sample (Level 2) - Obtain 100

Every 500 Service Hours

Cooling System Coolant Sample (Level 1) - Obtain 100
Differential and Final Drive Oil Sample - Obtain .. 103
Hydraulic System Oil Sample - Obtain 116
Hydrostatic Drive Oil Sample - Obtain 118

Every 500 Service Hours or 3 Months

Engine Oil and Filter - Change 109
Fuel System Filter and Water Separator Element - Replace 112
Fuel Tank Cap and Strainer - Clean 113

Every 1000 Service Hours

Battery Hold-Down - Tighten 89

Every 1000 Service Hours or 6 Months

Hydraulic System Oil - Change 114
Power Train Oil Filter - Replace 119
Rollover Protective Structure (ROPS) - Inspect .. 122

Every 1000 Service Hours or 1 Year

Engine Valve Lash - Check 111

Every 2000 Service Hours or 1 Year

Differential and Final Drive Oil - Change 101
Engine Air Filter Service Indicator - Inspect/Replace 107
Fuel Injection Timing - Check 111
Hydrostatic Drive Oil - Change 116
Service Brake Disc Wear - Check 123

Every Year

Cooling System Coolant Sample (Level 2) - Obtain 100

Every 3000 Service Hours

Steering Column Spline (HMU Steering) - Lubricate 124

Every 3 Years After Date of Installation or Every 5 Years After Date of Manufacture

Seat Belt - Replace 123

Every 6000 Service Hours or 3 Years

Cooling System Coolant Extender (ELC) - Add 99
Cooling System Water Temperature Regulator - Replace 101

Every 12 000 Service Hours or 6 Years

Cooling System Coolant (ELC) - Change 97

i02019196

Articulation Bearings - Lubricate

SMCS Code: 7057-086-BD; 7065-086-BD; 7066-086-BD

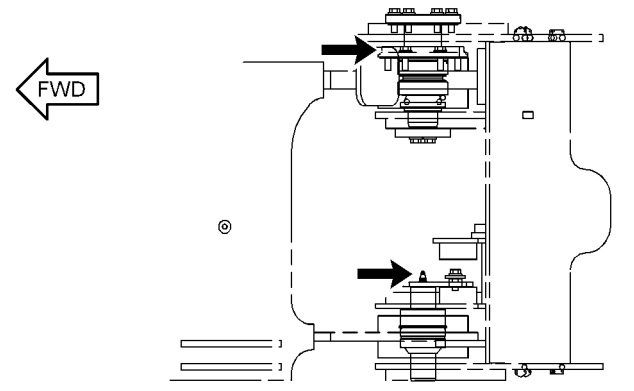


Illustration 103 g01043245

1. Wipe off the grease fittings before you apply lubricant.
2. Apply lubricant to the grease fittings for the pivot bearings.

i00802472

Axle Oscillation Bearings - Lubricate

SMCS Code: 3268-086-BD; 3278-086-BD

Wipe the remote grease fittings before you apply lubricant to the remote grease fittings.

Illustration 104 g00389098

The remote grease fittings for the axle oscillation bearings are located in the center of the machine on the left side.

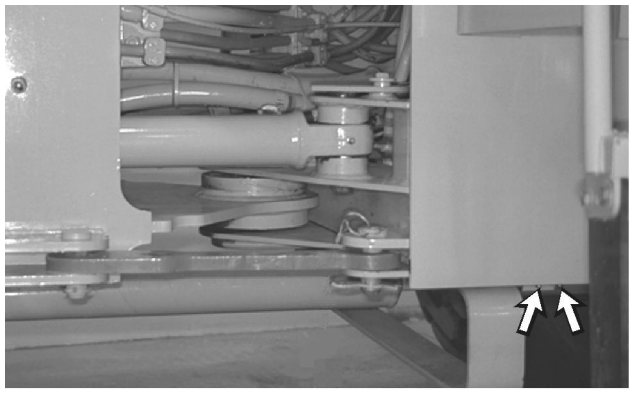


Illustration 105 g00389099

Apply lubricant to the remote grease fittings for the axle oscillation bearings.

i01999141

Backup Alarm - Test

SMCS Code: 7406-081

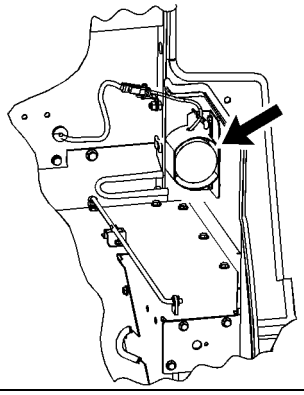


Illustration 106 g01034357

The backup alarm is located at the rear of the machine.

1. Turn the engine start switch to ON.
2. Apply the service brakes.
3. Disengage the parking brake.
4. Move the directional control to REVERSE.

The backup alarm should sound immediately. The backup alarm should continue to sound until the directional control is moved to the NEUTRAL position or to the FORWARD position.

i01999170

Battery - Clean

SMCS Code: 1401-070

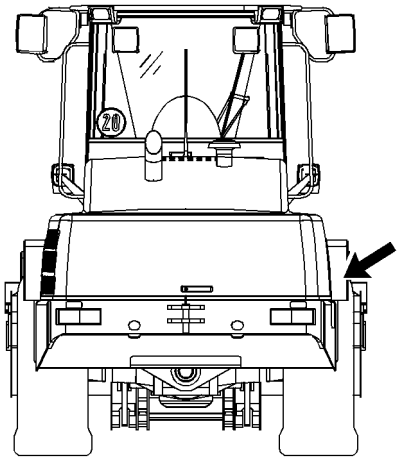


Illustration 107 g01034366

The batteries are located at the right rear side of the machine.

1. Open the engine access door on the back side of the machine. Use the prop rod to hold the engine access door open.
2. Clean the battery surface with a clean cloth. Keep the terminals clean and keep the terminals coated with petroleum jelly. Install the post cover after you coat the post with petroleum jelly. Make sure that the battery cables are installed securely.
3. Remove the prop rod. Close the engine access door.

i01586700

Battery Hold-Down - Tighten

SMCS Code: 7257-527

Tighten the hold-downs for the battery in order to prevent the batteries from moving during machine operation.

i03747851

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401-040; 1401-510; 1402-040; 1402-510

1. Turn the engine start switch to the OFF position. Turn all switches to the OFF position.

Illustration 108 g00387726

2. Open the engine access door on the back of the machine. Use the prop rod to hold the engine access door open.
3. Turn the battery disconnect switch to the OFF position. Remove the battery disconnect switch key.

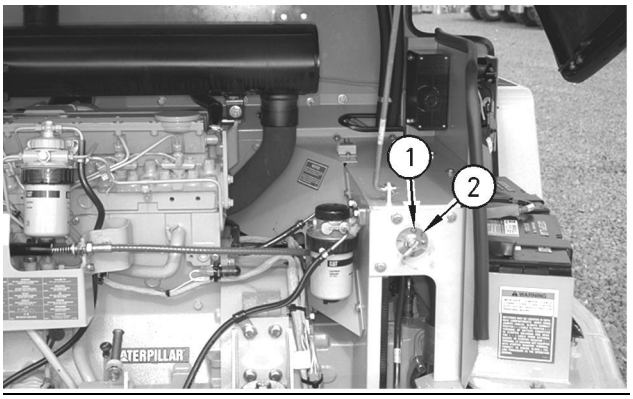


Illustration 109 g00389326

(1) Off
(2) ON

4.

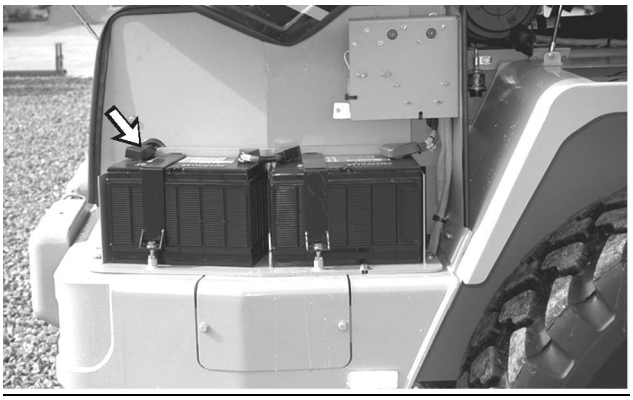


Illustration 110 g00389632

NOTICE
Do not allow the disconnected battery cable to contact the disconnect switch.

5. Disconnect the negative battery cable from the disconnect switch.
6. Disconnect the negative battery cable at the battery.
7. Disconnect the positive battery cable at the battery.
8. Inspect the battery terminals for corrosion. Inspect the battery cables for wear or damage.
9. Make any necessary repairs. If necessary, replace the battery cables or the battery.
10. Connect the positive battery cable at the battery.
11. Connect the negative battery cable at the battery.
12. Connect the battery cable at the battery disconnect switch.
13. Install the key and turn the battery disconnect switch ON.

Recycle the Battery

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i01999569

Belts - Inspect/Adjust/Replace

SMCS Code: 1357-025; 1357-040; 1357-510

Note: Never replace one belt. Always replace two belts, if equipped.

Air Conditioner Belt

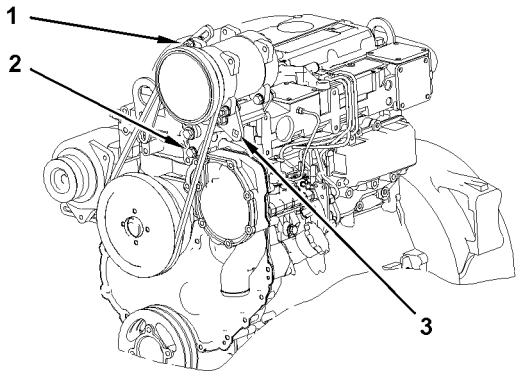


Illustration 111 g01037188

Inspect

1. Stop the engine.
2. Inspect the condition of the air conditioner belt. Check the tension of the belt. If the air conditioner belt requires adjustment or replacement, proceed to the “Adjust” procedure.

Adjust

1. Loosen mounting bolt (2). Loosen adjustment bolt (1).
2. Insert a ratchet with a square drive into hole (3). Use the ratchet as a lever in order to rotate the compressor until the correct belt tension is achieved.

Note: The tension of a belt with more than 30 minutes of operation at rated speed should be 445 ± 44 N (100 ± 10 lb). The tension of a belt with 30 minutes of operation or less at rated speed should be 578 ± 111 N (130 ± 25 lb).

3. Tighten adjustment bolt (1). Tighten mounting bolt (2).
4. Recheck the belt tension. If the tension is incorrect, repeat the “Adjust” procedure.

Replace

1. Loosen mounting bolt (2). Loosen adjustment bolt (1).
2. Insert a ratchet with a square drive into hole (3). Use the ratchet as a lever in order to rotate the compressor until the belt is loose.
3. Remove the belt.
4. Replace the belt with a new belt.
5. Insert a ratchet with a square drive into hole (3). Use the ratchet as a lever in order to rotate the compressor until the correct belt tension is achieved.
6. Tighten adjustment bolt (1). Tighten mounting bolt (2).

Alternator Belts

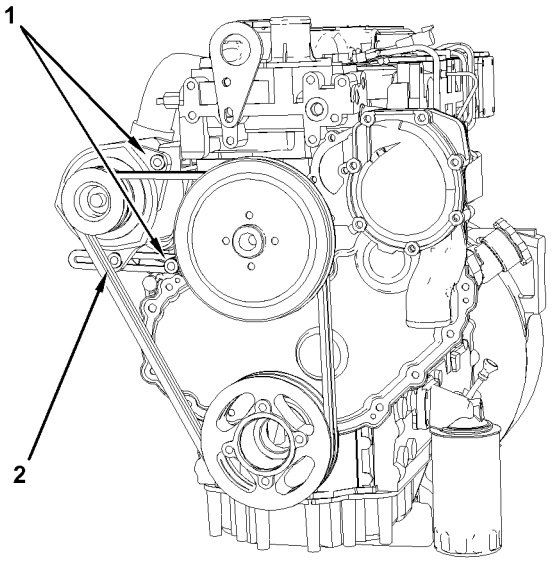


Illustration 112 g01039887

Inspect

1. Inspect the condition of the alternator belt.

   If the alternator belt requires adjustment or replacement, proceed to the “Adjust” procedure.

Adjust

1. Loosen mounting bolts (1). Loosen adjustment bolt (2).
2. Move the alternator until the correct belt tension is achieved.

Note: The tension of a belt with more than 30 minutes of operation at rated speed should be 355 N (80 lb).

3. Tighten adjustment bolt (2). Tighten mounting bolts (1).
4. Recheck the belt tension. If the tension is incorrect, repeat the “Adjust” procedure.

Replace

1. Loosen mounting bolts (1). Loosen adjustment bolt (2).
2. Move the alternator until the belt is loose.
3. Remove the old belt.
4. Install a new belt.
5. Move the alternator until the correct belt tension is achieved.
6. Tighten adjustment bolt (2). Tighten mounting bolts (1).

i01999668

Brake Accumulator - Check

SMCS Code: 4263-535

1. Turn the engine start switch to the ON position. The alert indicator for brake oil pressure should illuminate if the braking system is not at normal operating pressure.
2. Start the engine. Run the engine at half speed for two minutes in order to increase the accumulator pressure. The alert indicator for brake oil pressure should go off.
3. Stop the engine. Apply the service brake pedal and release the service brake pedal until the alert indicator for brake oil pressure comes on. This will decrease the accumulator pressure. A minimum of three applications of the service brake pedal are required.
4. If the alert indicator illuminates before three applications of the brake pedal, measure the accumulator precharge pressure. Your authorized dealer can measure the nitrogen gas pressure in the accumulator. Use only dry nitrogen gas for recharging.

i02010604

Braking System - Test

SMCS Code: 4011-081; 4267-081

Reference: For the correct procedure, refer to Systems Operation, Testing and Adjusting, RENR6495, “Brake System”.

i01920076

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801-040; 6801-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

1. Raise the bucket. Place a block under the bucket.
2. Lower the bucket to the blocking.

   Do not block up the bucket too high. Block up the bucket so that the bucket is high enough to remove the cutting edges and the end bits.
3. Remove the bolts. Remove the cutting edge and the end bits.
4. Clean the contact surfaces.
5. Use the opposite side of the cutting edge, if this side is not worn.
6. Install a new cutting edge, if both edges are worn.
7. Install the bolts. Tighten the bolts to the specified torque.
8. Raise the bucket. Remove the blocks.
9. Lower the bucket to the ground.
10. After a few hours of operation, check the bolts for proper torque.

i02001470

Bucket Linkage and Loader Cylinder Bearings - Lubricate

SMCS Code: 6101-086-BD; 6107-086-BD

914G

Tilt Cylinder and Bucket Linkage

1. Wipe off the grease fittings before you apply lubricant.

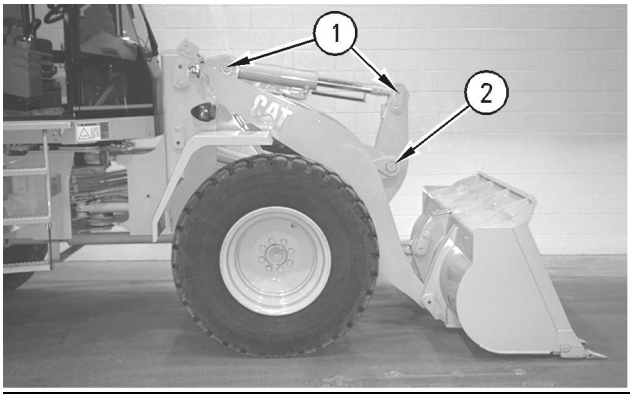


Illustration 113 g00414607

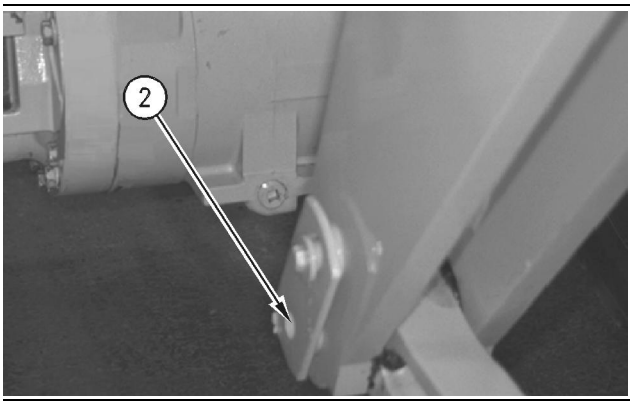


Illustration 114 g00414605

2. Lubricate the grease fittings for the tilt cylinder (1). Lubricate the grease fittings for the tilt linkage (2).

Lift Arm and Cylinder Linkage

1. Wipe off the grease fittings before you apply lubricant.

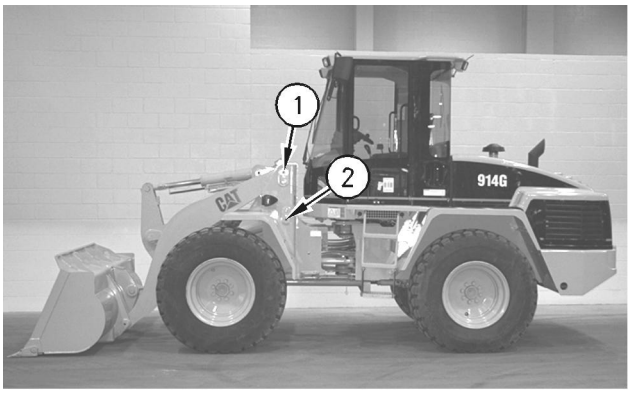


Illustration 115 g00403621

2. Apply lubricant to grease fittings (1) for the frame and for the lift arm of the machine. There is a grease fitting for each side of the machine.

3. Apply lubricant to grease fittings (2) for the head end of the lift cylinders of the machine. There is a grease fitting for each side of the machine.

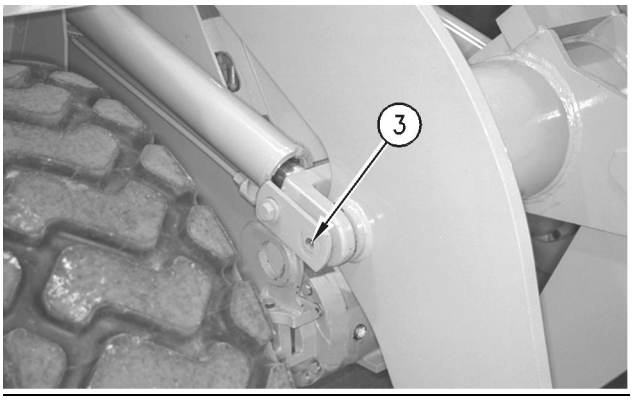


Illustration 116 g00403638

4. Apply lubricant to grease fittings (3) for the rod ends of the lift cylinders. There is a grease fitting for each side of the machine.

IT14G

Attachment Arm and Cylinder Linkage

1. Wipe off the grease fittings before you apply lubricant.

Illustration 117 g00474190

2. Apply lubricant to the three grease fittings for the lift arm linkage on the right side of the machine.

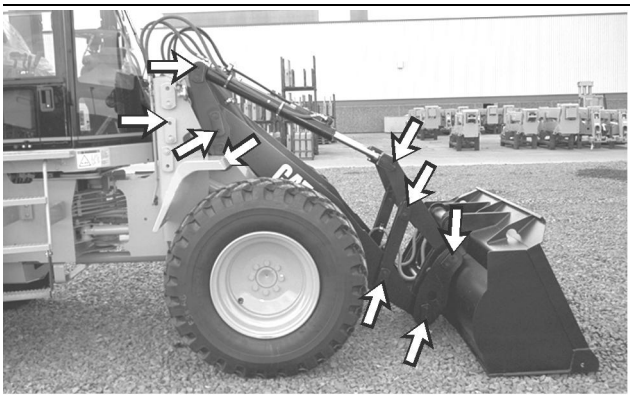


Illustration 118 g00474200

3. Apply lubricant to the grease fittings for the tilt linkage on each side of the machine.

i02021756

Bucket Pivot Bearings - Lubricate

SMCS Code: 6107-086-BD

S/N: PDF1-Up

1. Wipe off the grease fittings before you apply lubricant.

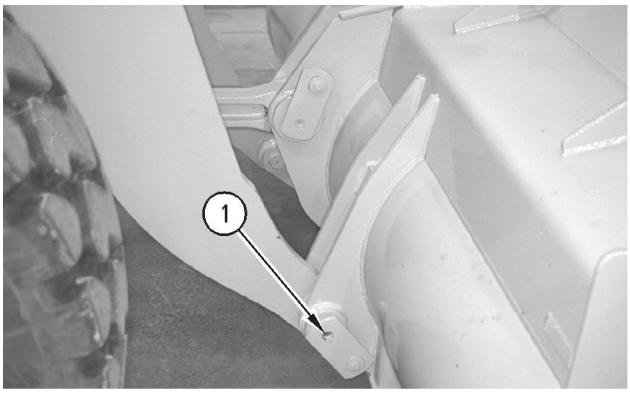


Illustration 119 g00391443

2. Apply lubricant to grease fittings (1) for the lower pivot pins of the bucket. There is a grease fitting for each side of the bucket.

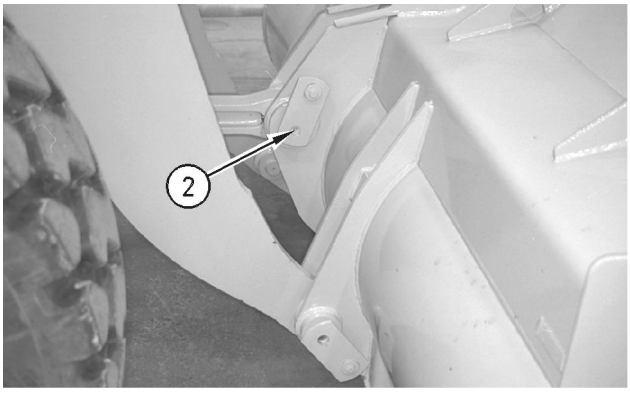


Illustration 120 g00392317

3. Apply lubricant to grease fitting (2) for the upper pivot pin of the bucket.

i03657242

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

⚠ WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

Bucket Tips

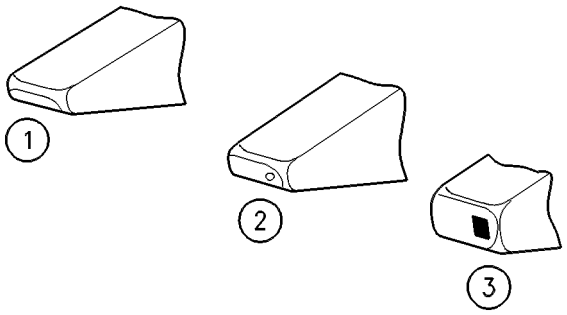


Illustration 121 g00101352

(1) Usable
(2) Replace the tip.
(3) Replace the tip.

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

1. Remove the pin from the bucket tip. The pin can be removed by one of the following methods.

- Use a hammer and a punch from the retainer side of the bucket to drive out the pin.
- Use a Pin-Master. Follow Step 1.a through Step 1.c for the procedure.

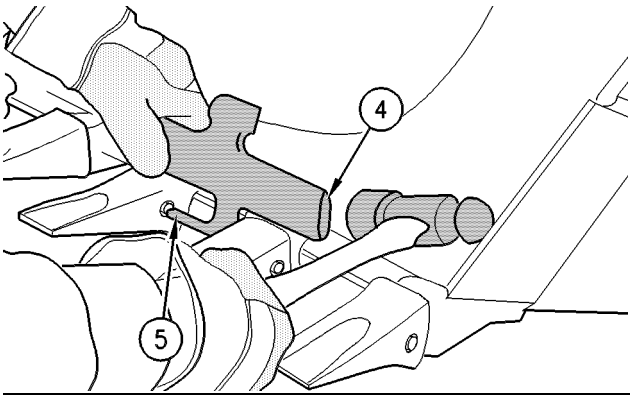


Illustration 122 g00590670

(4) Back of Pin-Master
(5) Extractor

a. Place the Pin-Master on the bucket tooth.

b. Align extractor (5) with the pin.

c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

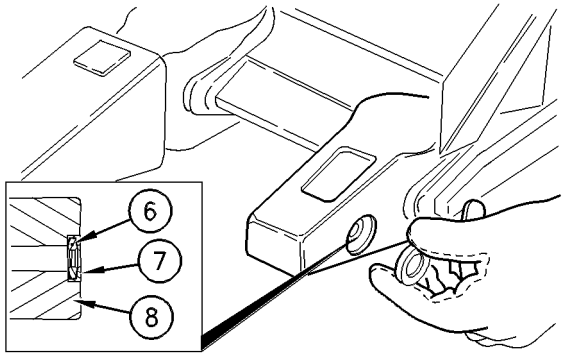


Illustration 123 g00590819

(6) Retainer
(7) Retaining washer
(8) Adapter

2. Clean the adapter and the pin.

3. Fit retainer (6) into retaining washer (7). Install this assembly into the groove that is in the side of adapter (8).

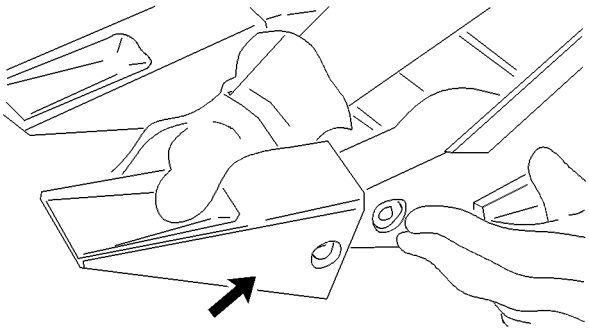


Illustration 124 g00101359

4. Install the new bucket tip onto the adapter.

Note: The bucket tip can be rotated by 180 degrees in order to allow greater penetration or less penetration.

5. Drive the pin through the bucket tip. The pin can be installed by using one of the following methods:

- From the other side of the retainer, drive the pin through the bucket tip, the adapter, and the retainer.
- Use a Pin-Master. Follow Step 5.a through Step 5.e for the procedure.

Note: To correctly install the pin into the retainer, the pin must be driven in from the right side of the tooth. Improper installation of the pin can result in the loss of the bucket tip.

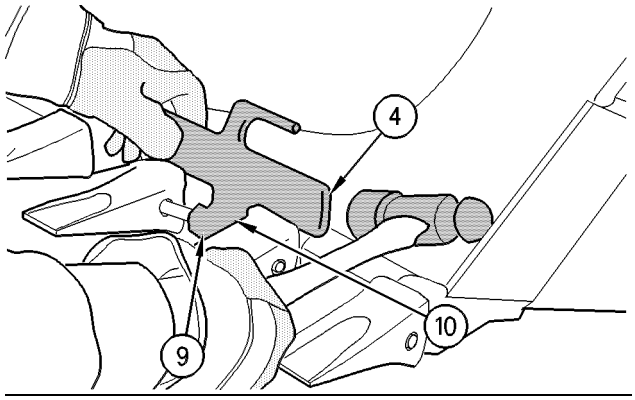


Illustration 125 g00590666

(4) Back of Pin-Master
(9) Pin setter
(10) Pin holder

a. Insert the pin through the bucket tooth.

b. Place the Pin-Master over the bucket tooth and locate the pin in the hole of holder (10).

c. Strike the tool with a hammer at the back of the tool (4) in order to start the pin.

d. Slide pin holder (10) away from the pin and rotate the tool slightly in order to align pin setter (9) with the pin.

e. Strike the end of the tool until the pin is fully inserted.

6. After you drive the pin, make sure that the retainer fits snugly into the pin groove.

K-Series Tip

Removal

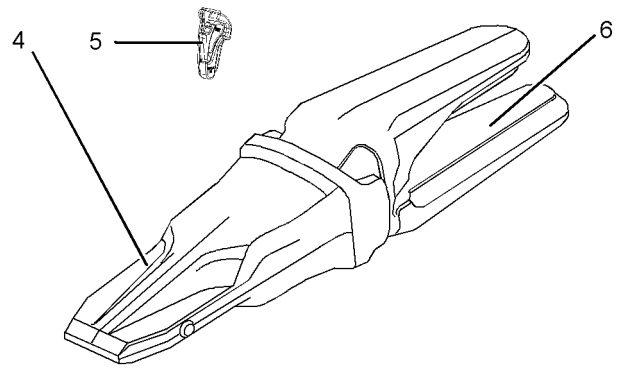


Illustration 126 g01389463

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

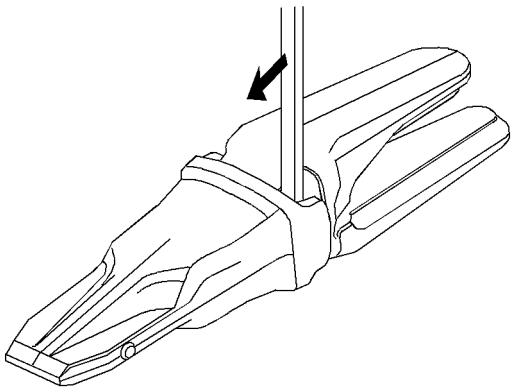


Illustration 127 g01175361

1. Use a pry bar in order to disengage retainer (5).
2. Use the pry bar in order to remove retainer (5) from bucket tip (4).
3. Remove bucket tip (4) from adapter (6) with a slight counterclockwise rotation.
4. Clean adapter (6).

Installation

1. Clean the adapter and the area around the latch, if necessary.
2. Install the new bucket tip onto the adapter with a slight clockwise rotation.

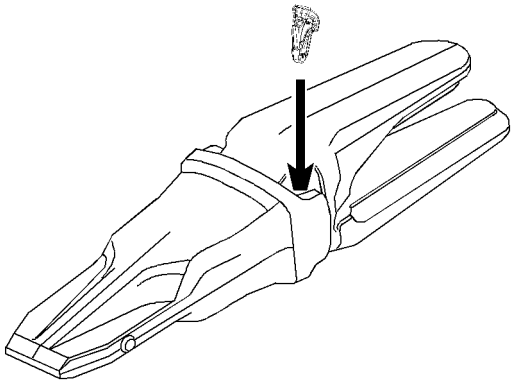


Illustration 128 g01124736

3. Install the retainer. Make sure that the retainer's latch catches under the tip pocket.
4. Make sure that the latch is properly seated by trying to remove the bucket tip.

i02003771

Bucket Wear Plates - Inspect/Replace

SMCS Code: 6120-040; 6120-510

⚠ WARNING

Personal injury or death can result from falling bucket.

When working under or around the bucket or linkage, with the bucket raised, proper support must be provided for the bucket and/or the linkage.

Replace the wear plates before damage to the bottom of the bucket occurs.

1. Raise the bucket and block up the bucket.
2. Loosen bolts and remove wear plates.
3. Install new wear plates. Tighten the bolts to the specified torque.

   Reference: For more information, refer to Specifications, SENR3130, “Torque Specifications”.

i02003823

Cab Air Filter - Clean/Replace

SMCS Code: 7342-070; 7342-510

Note: Clean the filters more often in dusty conditions. If there is a noticeable reduction in the airflow from the air vents, check the filters.

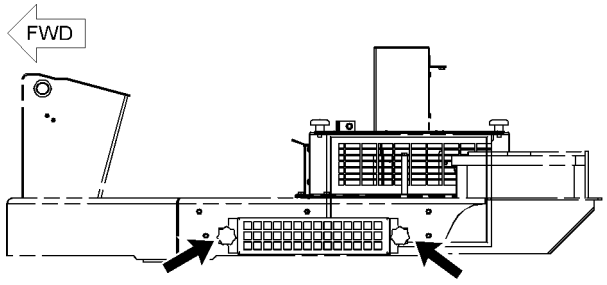


Illustration 129 g01036552

The external cab filter is located on the left side of the operator compartment under the steps.

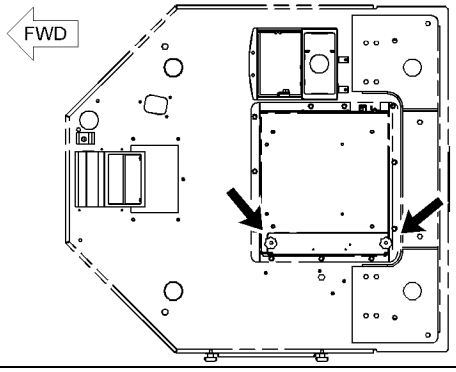


Illustration 130 g01036553

The internal cab filter is located near the left side of the operator seat.

1. Remove the filter covers.
2. Remove the filters.

Note: Raise the operator seat in order to remove the internal cab filter.

3. Clean the filters with compressed air. You can also wash the filters with a solution of warm water and of a nonsudsing household detergent.

Note: Do not wash the filters while the filters are installed on the machine. Do not spray water into the cab air filter when you are washing the machine.

4. Rinse the filters in clean water. Air dry the filters thoroughly.
5. Replace any filters that are worn or damaged.
6. Install the filters and replace the covers.

Note: Face the seal toward the parking brake lever when you install the internal cab filter.

i02003893

Circuit Breakers - Reset

SMCS Code: 1420-529

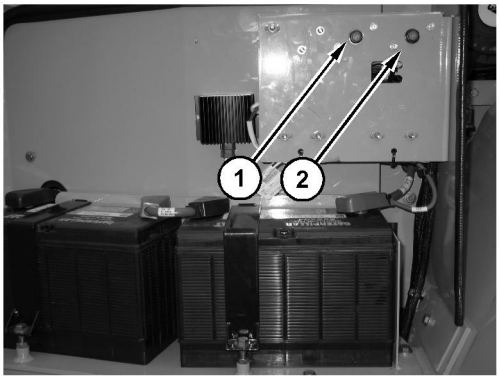


Illustration 131 g01041385

The circuit breakers are located on the right side of the machine.

Alternator Circuit Breaker (1) – 60 Amp

Depress the button in order to reset the circuit breaker. If the circuit is functioning properly, the button will remain depressed. If the button will not remain depressed, check the electrical circuit.

Main Circuit Breaker (2) – 60 Amp

Depress the button in order to reset the circuit breaker. If the circuit is functioning properly, the button will remain depressed. If the button will not remain depressed, check the electrical circuit.

i02005104

Cooling System Coolant (ELC) - Change

SMCS Code: 1395-044-NL

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

If an Extended Life Coolant was previously used, flush the cooling system with clean water. No other cleaning agents are required. Use the following procedure to change the Extended Life Coolant.

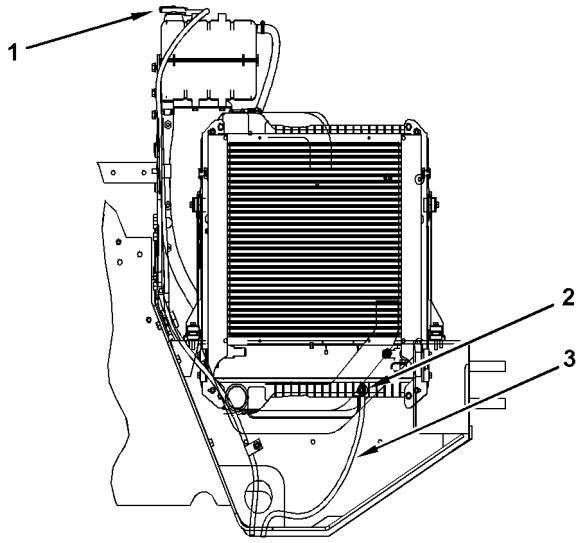


Illustration 132 g01037085

1. Slowly loosen cooling system pressure cap (1) in order to relieve system pressure. Remove the cooling system pressure cap.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

2. Place drain hose (3) into a suitable container. Open drain valve (2) on the bottom of the radiator. Allow the coolant to drain into a suitable container.

3. Flush the cooling system with clean water until the draining water is clean. Close the drain valve.

NOTICE
Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

4. Add the Extended Life Coolant.

Reference: For the refill capacity of the cooling system, refer to Operation and Maintenance Manual, “Capacities (Refill)”.

Reference: For information about adding Extender to your cooling system, refer to Special Publication, SEBU6250 or consult your Caterpillar dealer.

5. Start the engine. Run the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

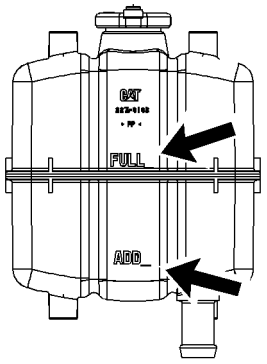


Illustration 133 g01037092

6. Maintain the coolant level between the “FULL” and “ADD” marks on the coolant overflow reservoir.

7. Install the cooling system pressure cap. Close the engine hood.

i02005135

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

NOTICE
Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants and Caterpillar Extender.

Use Caterpillar Extended Life Coolant (ELC) when you add coolant to the cooling system.

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for all cooling system requirements.

1. Stop the engine and allow the engine to cool.
2. Open the engine access door on the back side of the machine. Use the prop rod to hold the engine access door open. Remove the cooling system pressure cap slowly in order to relieve the pressure.
3. Use a Coolant Conditioner Test Kit in order to check the concentration of the coolant.

Note: It may be necessary to drain some coolant from the radiator so that Caterpillar Extender can be added to the cooling system.

Note: Discard drained fluids according to local regulations.

4. Add Caterpillar Extended Life Coolant (ELC) to the cooling system.
5. Inspect the gasket of the cooling system pressure cap. If the gasket is damaged, replace the pressure cap.
6. Install the cooling system pressure cap.
7. Remove the prop rod. Close the engine access door.

i02005165

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

1. Open the engine access door on the back side of the machine. Use the prop rod to hold the engine access door open.

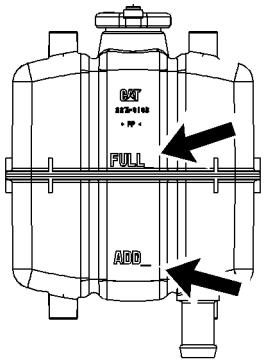


Illustration 134 g01037092

2. Maintain the coolant level between the “FULL” mark and the “ADD” mark on the coolant overflow reservoir.

Note: If you need to add coolant daily, check the cooling system for leaks.

3. Remove the prop rod. Close the engine access door.

i02009624

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE
Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

Note: Level 1 results may indicate a need for Level 2 Analysis.

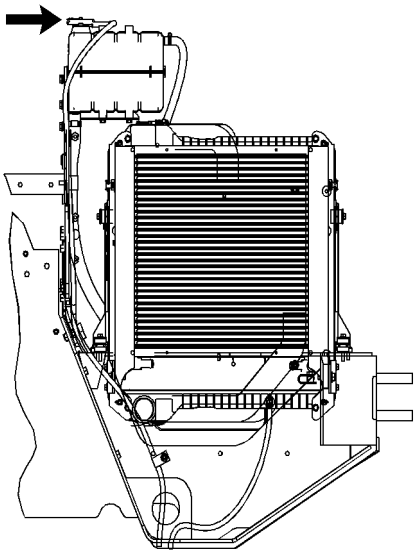


Illustration 135 g01039025

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

1. Use the following guidelines for proper sampling of the coolant:
   - Complete the information on the label for the sampling bottle before you begin to take the samples.
   - Keep the unused sampling bottles stored in plastic bags.
   - Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
   - Keep the lids on empty sampling bottles until you are ready to collect the sample.
   - Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
   - Never collect samples from expansion bottles.
   - Never collect samples from the drain for a system.
2. Submit the sample for Level 1 analysis.

Reference: For additional information about coolant analysis, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i02009631

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE
Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

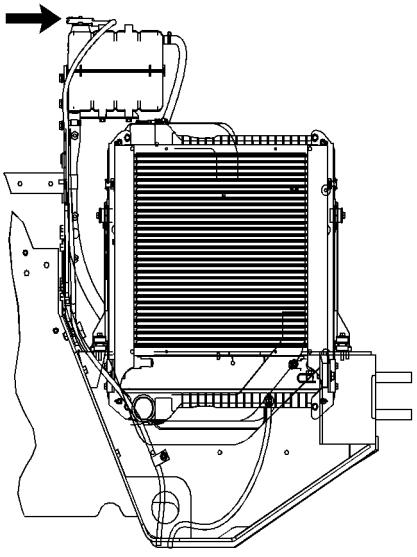


Illustration 136 g01039025

1. Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Caterpillar dealer.

   Reference: Refer to Operation and Maintenance Manual, “Cooling System Coolant Sample (Level 1) - Obtain” for the guidelines for proper sampling of the coolant.

2. Submit the sample for Level 2 analysis.

Reference: For additional information about coolant analysis, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i02005169

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

NOTICE
Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

NOTICE
Caterpillar engines incorporate a shunt design cooling system and require operating the engine with a thermostat installed.

If the thermostat is installed wrong, it will cause the engine to overheat. Inspect gaskets before assembly and replace if worn or damaged.

Replace the water temperature regulator and the seals while the cooling system is completely drained or while the coolant is drained to a level that is below the regulator housing.

Reference: For the correct procedure, refer to Engine Supplement, RENR7769, “Disassembly and Assembly 3054C Tier II Emissions”.

i02005234

Differential and Final Drive Oil - Change

SMCS Code: 3278-044-OC; 4011-044-OC

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Note: Wipe the covers and surfaces around openings before you check the oil and before you add oil.

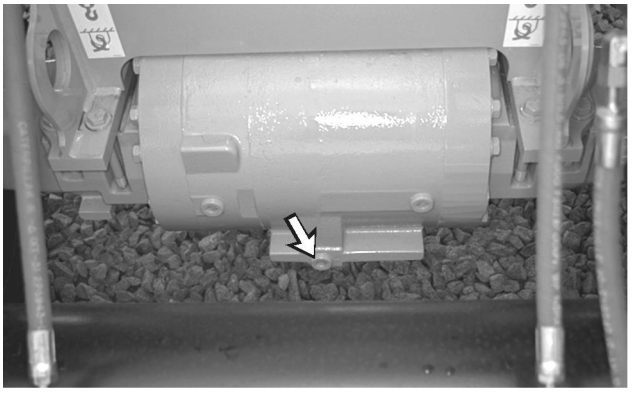


Illustration 137 g00493398
Front Differential and Final Drive Drain Plug

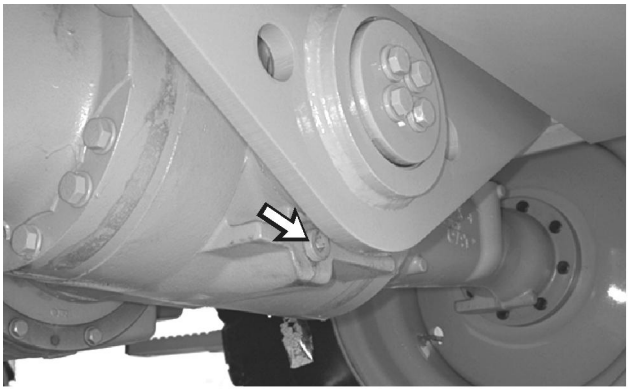


Illustration 138 g00393958
Rear Differential and Final Drive Drain Plug

1. Remove the drain plugs for the front differential and for the rear differential. Allow the oil to drain into a suitable container.

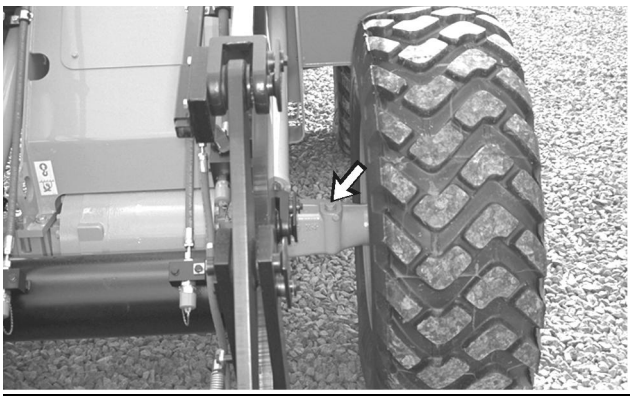


Illustration 139 g00475408

Dipstick/Fill Plug for the Front Differential and Final Drive

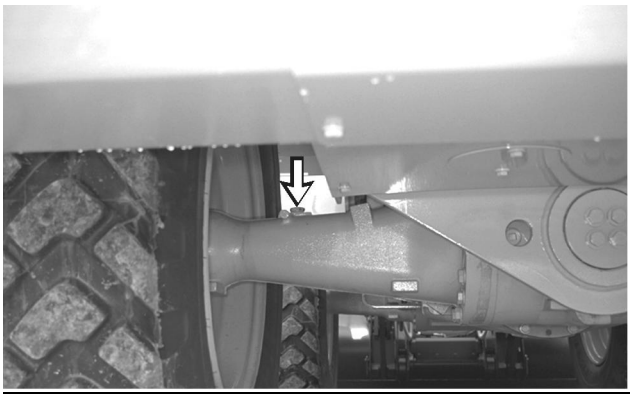


Illustration 140 g00393646

Dipstick/Fill Plug for the Rear Differential and Final Drive

2. Remove the dipstick/fill plug for the front differential and the dipstick/fill plug for the rear differential.

3. Clean the drain plugs and install the drain plugs.

4. Add 0.47 L (0.50 qt) of 1U-9891 Hydraulic Oil Additive.

5. Fill the axles with oil.

   Reference: Refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities”.

6. Install the dipstick/fill plugs for each differential. Operate the machine for a few minutes and allow the oil to flow completely through the axles.

7. Remove the dipstick/fill plugs. Maintain the oil between the “ADD” mark and the “FULL” mark on the dipstick/fill plug of each differential.

8. Clean the dipstick/fill plugs and install the dipstick/fill plugs for each differential.

i00931613

Differential and Final Drive Oil Level - Check

SMCS Code: 3278-535-FLV; 4011-535-FLV

Wipe the area around the dipstick/fill plugs for the differential and final drives before you remove the plugs.

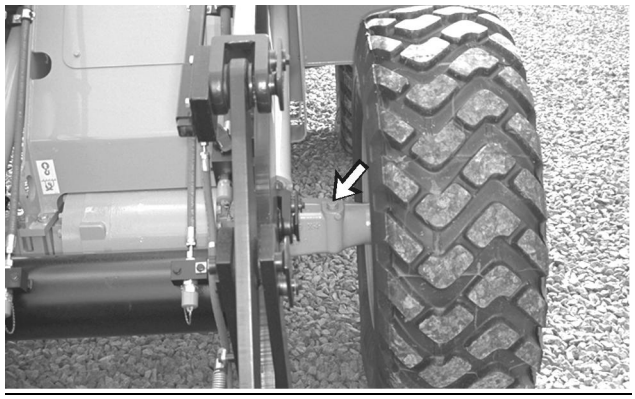


Illustration 141 g00475408

Dipstick/Fill Plug for the Front Differential and Final Drive

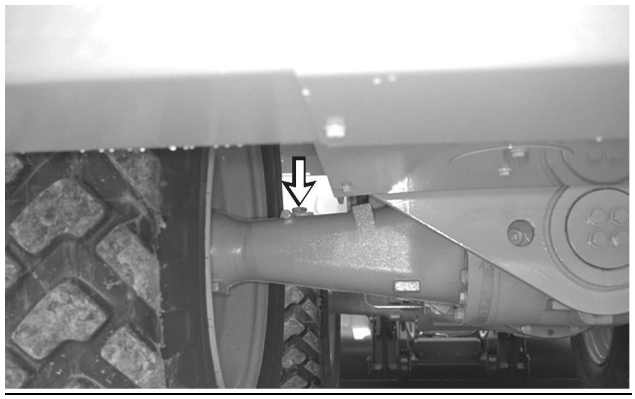


Illustration 142 g00393646

Dipstick/Fill Plug for the Rear Differential and Final Drive

1. Remove the dipstick/fill plug for the front differential and final drive in order to check the oil level.

2. The oil level should be between the “ADD” mark and the “FULL” mark on the dipstick/fill plug. Add oil, if necessary.

3. Clean the dipstick/fill plug and install the dipstick/fill plug for the front differential and final drive.

4. Repeat step 1 to step 3 for the rear differential.

i02005244

Differential and Final Drive Oil Sample - Obtain

SMCS Code: 3278-008; 4011-008; 4070-008; 7542

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

1. Operate the machine for a few minutes before you obtain the fluid sample. This will thoroughly mix the fluid for a more accurate sample.

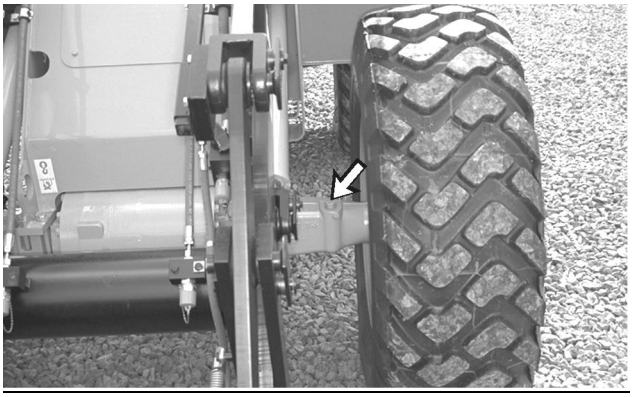


Illustration 143 g00475408

Dipstick/Fill Plug for the Front Differential and Final Drive

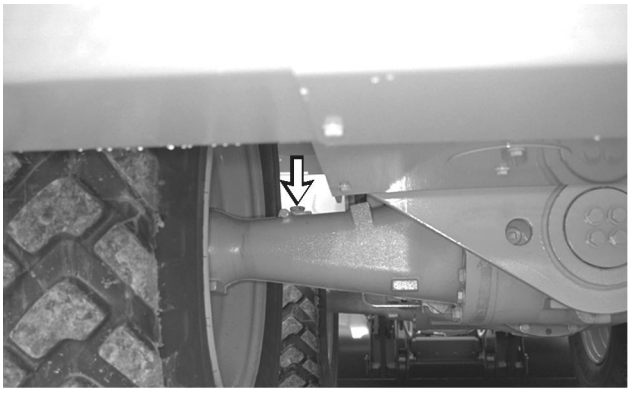


Illustration 144 g00393646

Dipstick/Fill Plug for the Rear Differential and Final Drive

2. Obtaining a sample will require a vacuum pump or an equivalent. Withdraw the oil through the filler opening.

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i02012010

Drive Shaft Spline (Center) - Lubricate

SMCS Code: 3253-086-SN

Note: Fully articulate the machine before lubricating the drive shaft spline.

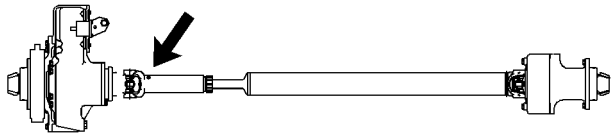


Illustration 145 g01040464

1. Wipe off the grease fitting.
2. Apply lubricant through the grease fitting on the drive shaft spline.

i02005692

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-070-PY; 1054-510-PY

1. Open the access door for the air filter housing.

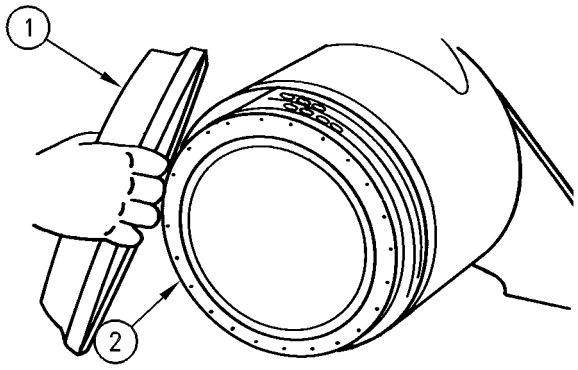


Illustration 146 g00102316

2. Remove cover (1).

3. Remove primary filter element (2).

4. Clean the inside of the air filter housing.

5. Install a clean primary air filter element. For more information, refer to “Cleaning the Primary Air Filter Element”.

6. Install cover (1).

7. Reset the engine air filter service indicator.

Reference: For more information, refer to Operation and Maintenance Manual, “Engine Air Filter Service Indicator - Inspect/Replace”.

8. Close the access door.

Cleaning the Primary Air Filter Element

NOTICE
Caterpillar recommends certified air filter cleaning services available at participating Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

The primary air filter element can be used up to six times after the element is properly cleaned and inspected. When the primary air filter element is cleaned, check for rips or tears in the filter material. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless of the number of cleanings.

NOTICE
Do not clean the air filter elements by bumping or tapping. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

Visually inspect the primary air filter element before cleaning. Inspect the air filter element for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

There are two common methods that are used to clean the primary air filter element:

- Pressurized air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean a primary air filter element that has not been cleaned more than two times. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

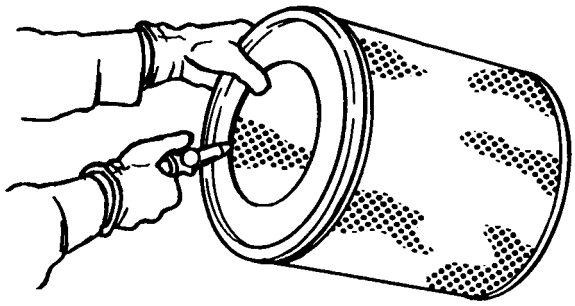


Illustration 147 g00281692

Note: When the primary air filter element is cleaned, always begin with the inside of the filter in order to force dirt particles toward the outside.

Aim the hose so that the air flows inside the element along the length of the filter in order to help prevent damage to the paper pleats. Do not aim the stream of air directly at the primary air filter element. Dirt could be forced further into the pleats.

Vacuum Cleaning

Vacuum cleaning is another method for cleaning a primary air filter element which requires daily cleaning because of a dry, dusty environment. Cleaning with pressurized air is recommended prior to vacuum cleaning. Vacuum cleaning will not remove deposits of carbon and oil.

Inspecting the Primary Air Filter Elements

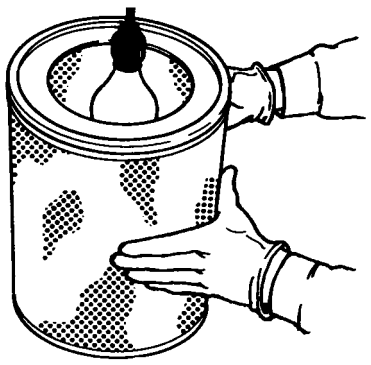


Illustration 148 g00281693

Inspect the clean, dry primary air filter element. Use a 60 watt blue light in a dark room or in a similar facility. Place the blue light in the primary air filter element. Rotate the primary air filter element. Inspect the primary air filter element for tears and/or holes. Inspect the primary air filter element for light that may show through the filter material. If it is necessary in order to confirm the result, compare the primary air filter element to a new primary air filter element that has the same part number.

Do not use a primary air filter element that has any tears and/or holes in the filter material. Do not use a primary air filter element with damaged pleats, gaskets or seals. Discard damaged primary air filter elements.

Storing Primary Air Filter Elements

If a primary air filter element that passes inspection will not be used, the primary air filter element can be stored for future use.

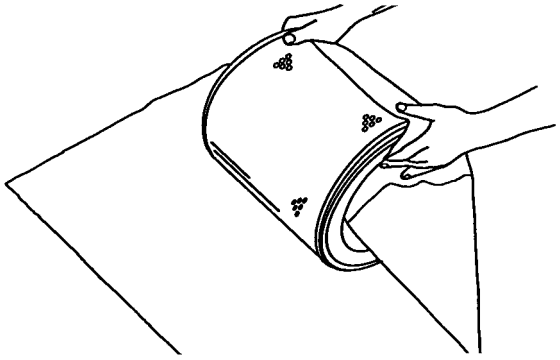


Illustration 149 g00281694

Do not use paint, a waterproof cover, or plastic as a protective covering for storage. An airflow restriction may result. To protect against dirt and damage, wrap the primary air filter elements in Volatile Corrosion Inhibited (VCI) paper.

Place the primary air filter element into a box for storage. For identification, mark the outside of the box and mark the primary air filter element. Include the following information:

- Date of cleaning
- Number of cleanings

Store the box in a dry location.

i01921521

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

1. Open the engine hood. The air filter is located on the left side of the machine.

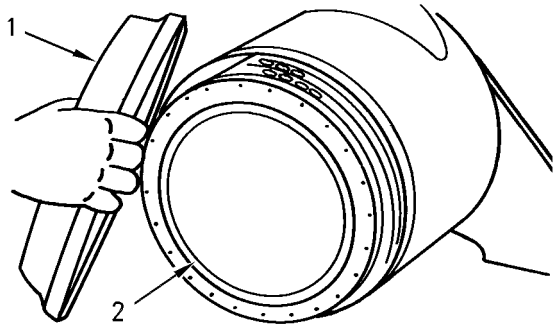


Illustration 150 g00281967

2. Remove cover (1) from the air filter housing.

Note: If necessary, unclamp the strap on the air filter housing so that the air filter housing can be moved for better access.

3. Remove primary element (2) from the air filter housing.

   Reference: Refer to Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace”.

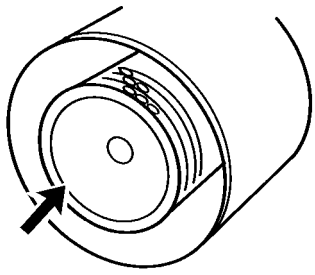


Illustration 151 g00882913

4. Clean the inside of the air filter housing. Then, remove the secondary element from the air filter housing.

5. Inspect the gasket between the air inlet pipe and the air filter housing. Replace the gasket if the gasket is damaged.

6. Install a new secondary element.

Note: A secondary element should never be cleaned. Always install a new secondary element filter.

7. Install a clean primary element.

8. Install cover (1).

9. Make sure that the air filter housing is secure.

10. Close the engine hood.

i02005699

Engine Air Filter Service Indicator - Inspect

SMCS Code: 7452-040

1. Start the engine.

2. Run the engine at high idle.

3. Open the left side engine compartment door.

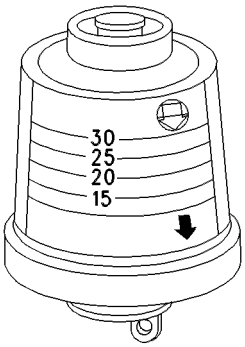


Illustration 152 g00103777

4. If the yellow piston in the engine air filter service indicator enters the red zone, service the air cleaner.

   Reference: For more information, refer to Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace”.

5. Stop the engine.

Note: Refer to Operation and Maintenance Manual, “Engine Air Filter Service Indicator - Inspect/Replace” in order to check an engine air filter service indicator that is faulty.

i02005700

Engine Air Filter Service Indicator - Inspect/Replace

SMCS Code: 7452-040; 7452-510

Some engines are equipped with a differential gauge for inlet air pressure. The differential gauge for inlet air pressure displays the difference in the pressure that is measured before the air cleaner element and the pressure that is measured after the air cleaner element. As the air cleaner element becomes dirty, the pressure differential rises.

Inspect

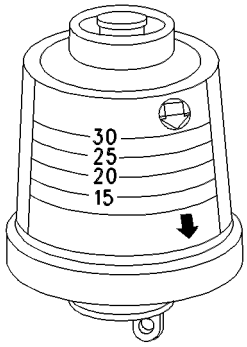


Illustration 153 g00103777

The air filter service indicator is located near the air filter housing.

Observe the air filter service indicator. The air cleaner element should be cleaned or the air cleaner element should be replaced when one of the following conditions occur:

- The yellow diaphragm enters the red zone.
- The red piston locks in the visible position.

Test

1. Check for ease of resetting. The service indicator should reset in less than three pushes.
2. Check the movement of the yellow core when the engine is accelerated to the engine rated speed. The yellow core should latch approximately at the greatest vacuum that is attained.
3. If the service indicator does not reset easily, or if the yellow core does not latch at the greatest vacuum, the service indicator should be replaced. If the new service indicator will not reset, the air line for the service indicator may be plugged.

Replace

Replace the service indicator if the following conditions exist:

- The machine is used in a severely dusty environment.
- The engine is overhauled.
- Major components are replaced.

Replace the service indicator annually regardless of the operating conditions.

Note: When a new service indicator is installed, excessive force may crack the top of the service indicator. Tighten the service indicator to a torque of 2 N·m (18 lb in).

i02010496

Engine Air Precleaner - Clean

SMCS Code: 1055-070

NOTICE
Service the air cleaner only with the engine stopped. Engine damage could result.

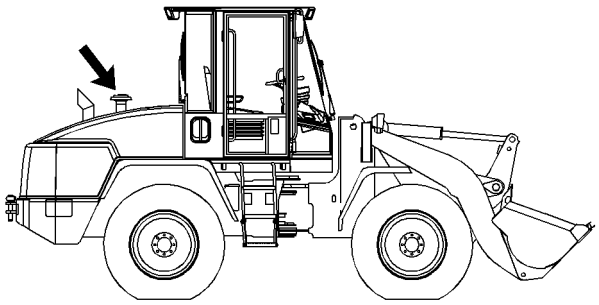


Illustration 154 g01039697

1. Remove the precleaner.
2. Inspect the air inlet screen for dirt and for trash. Remove the screen. Clean the screen if the screen is dirty.
3. Inspect the precleaner tube openings. Remove dirt and debris.
4. Clean the precleaner with compressed air or wash the precleaner in warm water. Dry all the parts.
5. Install the precleaner screen.

i02009900

Engine Oil Level - Check

SMCS Code: 1000-535-FLV

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

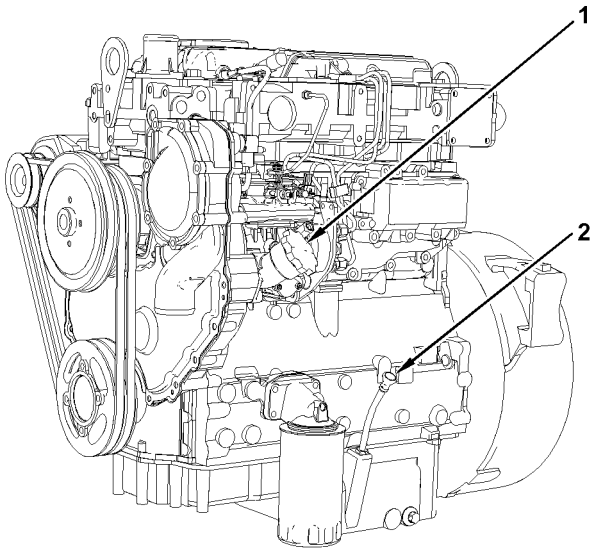


Illustration 155 g01039231

1. Open the engine access door. The engine oil dipstick (2) is located near the engine oil filter.
2. Remove engine oil dipstick (2) and wipe the dipstick with a clean cloth. Then, insert the dipstick and remove the dipstick again. This will ensure a more accurate measurement of the engine oil level.
3. Maintain the oil level between the marks on the dipstick.
4. If necessary, remove oil filler plug (1) and add oil through the oil filler tube.
5. Clean the oil filler plug and install the oil filler plug.
6. Close the engine access door.

i02010218

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 7542

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Operate the machine for a few minutes before you obtain the fluid sample. This will thoroughly mix the fluid for a more accurate sample.

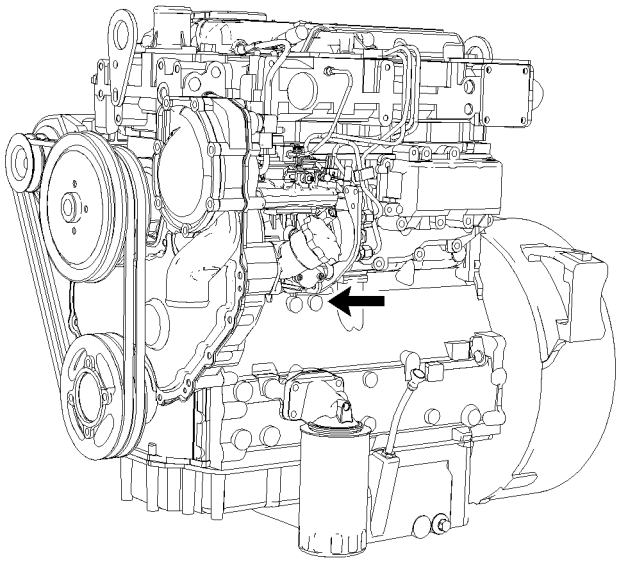


Illustration 156 g01039493

Location of the Oil Sample Port

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i02009652

Engine Oil and Filter - Change

SMCS Code: 1318-510

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Do not drain the oil when the engine is cold. As the oil cools, suspended waste particles settle on the bottom of the oil pan. The waste particles are not removed with the draining cold oil. Drain the crankcase with the engine stopped. Drain the crankcase with the oil warm. This draining method allows the waste particles that are suspended in the oil to be drained properly.

Failure to follow this recommended procedure will cause the waste particles to be recirculated through the engine lubrication system with the new oil.

Drain

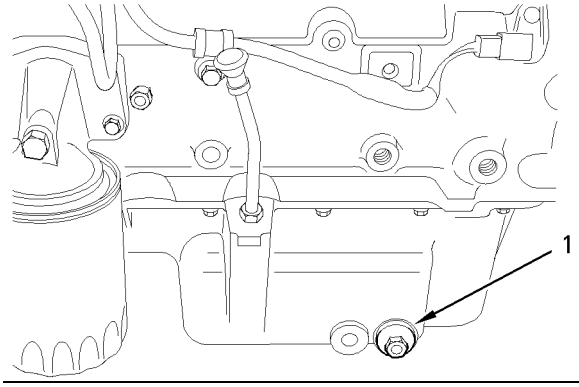


Illustration 157 g01003623

(1) Oil Drain Plug

1. After the engine has been run at the normal operating temperature, stop the engine. Use one of the following methods to drain the engine oil:

   - If the engine is equipped with a drain valve, turn the drain valve knob counterclockwise in order to drain the oil. After the oil has drained into a suitable container, turn the drain valve knob clockwise in order to close the drain valve.

- If the engine is not equipped with a drain valve, remove oil drain plug (1) in order to allow the oil to drain into a suitable container.

2. After the oil has drained, the oil drain plug should be cleaned and installed. If necessary, replace the O-ring seal on the drain plug.

Replace

1. Use a strap type wrench to remove the filter. Inspect the filter.

   Reference: For more information, refer to Operation and Maintenance Manual, “Oil Filter - Inspect”.

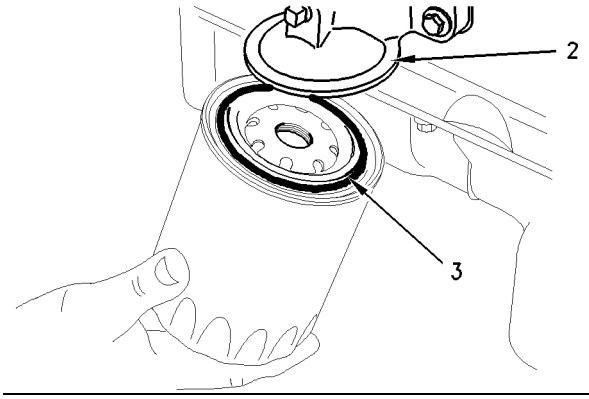


Illustration 158 g01003628

(2) Filter Mounting Base
(3) O-ring Seal

2. Clean the sealing surface of Filter Mounting Base (2). Make sure that the used O-ring seal has been completely removed.

3. Apply a thin film of clean engine oil to O-ring seal (3) of the new oil filter.

NOTICE
Do not fill the oil filters with oil before installing them. This oil would not be filtered and could be contaminated. Contaminated oil can cause accelerated wear to engine components.

4. Install the new oil filter by hand. When O-ring seal (3) contacts filter mounting base (2), tighten the filter by an additional 3/4 turn.

Fill

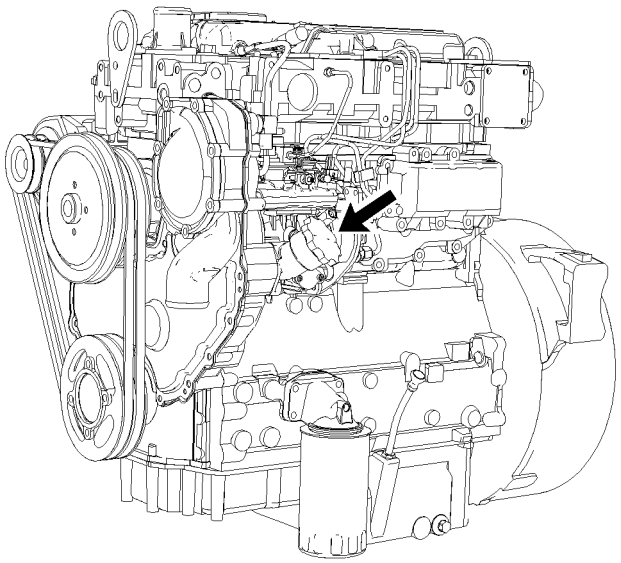


Illustration 159 g01039557

1. Remove the oil filler cap. Fill the crankcase with new oil.

   Reference: For more information, refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities”.

2. Clean the oil filler cap and install the oil filler cap.

3. Start the engine and run the engine at “LOW IDLE” for two minutes. Perform this procedure in order to ensure that the lubrication system has oil and that the oil filters are filled. Inspect the oil filter for oil leaks.

4. Stop the engine for a minimum of ten minutes.

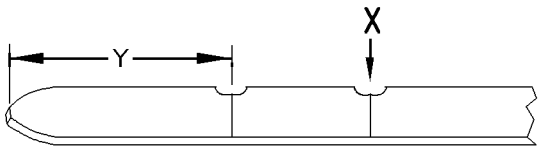


Illustration 160 g00998024

(Y) “ADD” mark. (X) “FULL” mark.

5. Remove the engine oil dipstick in order to check the oil level. Maintain the oil level between the “ADD” and “FULL” marks on the engine oil dipstick.

i03661727

Engine Valve Lash - Check

SMCS Code: 1105-025

Reference: For the complete procedure, refer to Systems Operation, RENR2410, “Testing and Adjusting”, “Engine Valve Lash - Inspect/Adjust”.

A qualified mechanic should adjust the engine valve lash and the fuel injector timing because special tools and training are required.

Crankcase Breather

Clean the engine crankcase breather on the valve cover before you install the valve cover.

i00916186

Fuel Injection Timing - Check

SMCS Code: 1251-531

Note: The correct fuel timing specification is found on the Engine Information Plate. Fuel timing specifications may vary for different engine applications and/or for different power ratings.

A qualified mechanic should adjust the fuel injection timing because special tools and training are required.

Refer to the Service Manual for the complete adjustment procedure for the fuel injection timing. Refer to your Caterpillar dealer for the complete adjustment procedure for the fuel injection timing.

i02006070

Fuel System Filter and Water Separator - Drain

SMCS Code: 1261-543; 1263-543

⚠ WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

NOTICE
The water separator is not a filter. The water separator separates water from the fuel. The engine should never be allowed to run with the water separator more than half full. Engine damage may result.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

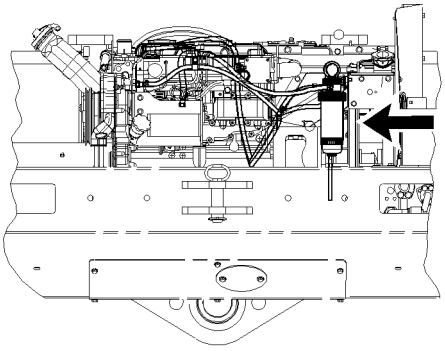


Illustration 161 g01037688
Location of the Fuel System Filter

1. Open the engine access door.

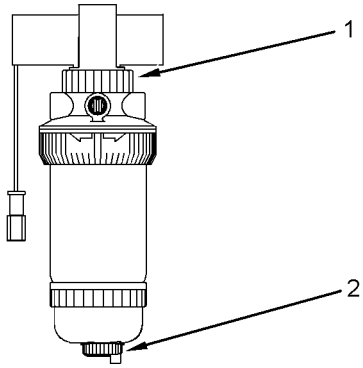


Illustration 162 g01037695
(1) Cap
(2) Drain Valve

2. Slowly open cap (1).

3. Attach a hose to the bottom of drain valve (2). Place the end of the hose in a suitable container.

4. Open drain valve (2) on the bottom of the water separator bowl. To open the drain valve, turn the drain valve clockwise as you are looking at the top of the water separator.

5. Allow the water and the fuel to drain into a suitable container.

6. Close the drain valve.

Note: The water separator is under suction during normal engine operation. The drain valve must be tightened in order to prevent air leakage into the fuel system.

7. Close cap (1).

8. Close the engine access door.

i02064929

Fuel System Filter and Water Separator Element - Replace

SMCS Code: 1261-510; 1263-510-FQ

⚠ WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

NOTICE

The water separator is not a filter. The water separator separates water from the fuel. The engine should never be allowed to run with the water separator more than half full. Engine damage may result.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Open the engine access door on the back side of the machine. Use the prop rod to hold the engine access door open. The water separator element is located on the right side of engine compartment.

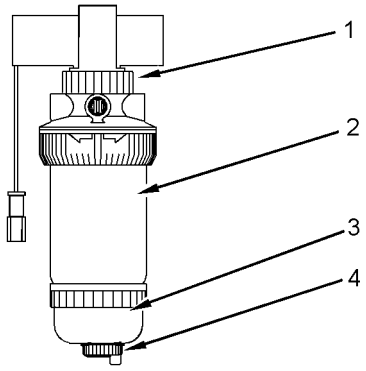


Illustration 163 g01037713

2. Open drain valve (4). Allow the water and fuel to drain into a suitable container.

3. Support the water separator element and rotate locking ring (1) counterclockwise. Remove the locking ring.

4. Remove the water separator element from the mounting base.

5. Remove water separator bowl (3) from the filter element. Clean the bowl and clean the O-ring groove.

Note: The bowl is reusable. Do not discard the bowl.

6. Inspect the O-ring seal of the bowl for damage. Replace the O-ring seal, if necessary.

7. Lubricate the O-ring seal with clean diesel fuel or lubricate the O-ring seal with motor oil. Place the O-ring seal in the bowl.

8. Spin the bowl by hand onto fuel system filter (2) until the bowl is snug. Do not use tools to tighten the fuel system filter.

9. Install the new water separator element. Rotate the locking ring clockwise in order to fasten the water separator element to the mounting base.

Note: The fuel system does not need to be primed manually. The fuel system is primed automatically by an electric fuel priming pump. Refer to the following step in order to activate the electric fuel priming pump.

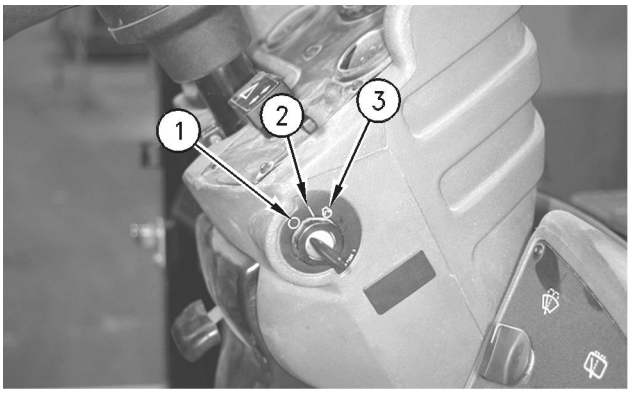


Illustration 164 g00395819

10. Turn the key switch to the START(3) position and release the key switch. This process will activate the relay for the fuel pump which allows power to reach the fuel priming pump.

i02006773

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-STR; 1273-070-Z2

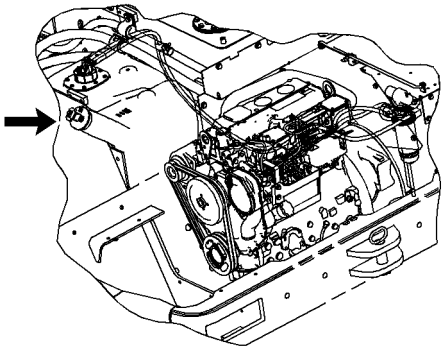


Illustration 165 g01040225

1. Open the engine access door on the back side of the machine. Use the prop rod to hold the engine access door open. The fuel tank cap is located on the left side of the engine compartment.

2. Remove the fuel tank cap.

3. Inspect the sealing surface for damage. Replace the fuel tank cap, if necessary.

4. Remove the strainer from the filler opening.

5. Inspect the strainer for damage. Replace the strainer, if necessary.

6. Use a clean, nonflammable solvent to wash the strainer and the fuel tank cap.

7. Install the strainer.

8. Install the fuel tank cap.

i02006830

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

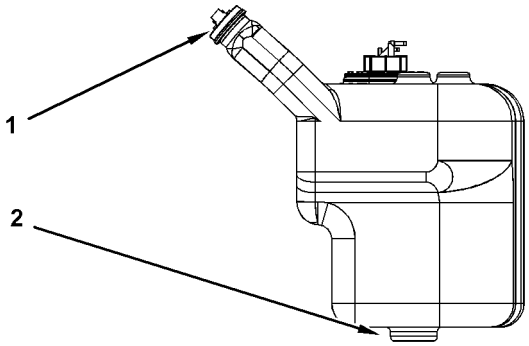


Illustration 166 g01043163

The fuel tank is located on the left side of the machine.

1. Slowly remove fuel tank cap (1) in order to relieve pressure.

2. Loosen drain plug (2). Allow the water and sediment to drain into a suitable container. Tighten drain plug (2).

Reference: Your machine may be equipped with an ecology drain. For more information, refer to Parts Manual, SEBP3757, “914G Wheel Loader” or Parts Manual, SEBP4016, “IT14G Integrated Toolcarrier”.

3. Replace fuel tank cap (1).

i02006844

Fuses - Replace

SMCS Code: 1417-510

NOTICE
Replace the fuses with the same type and size only. Otherwise, electrical damage can result.

If it is necessary to replace fuses frequently, an electrical problem may exist. Contact your Caterpillar dealer

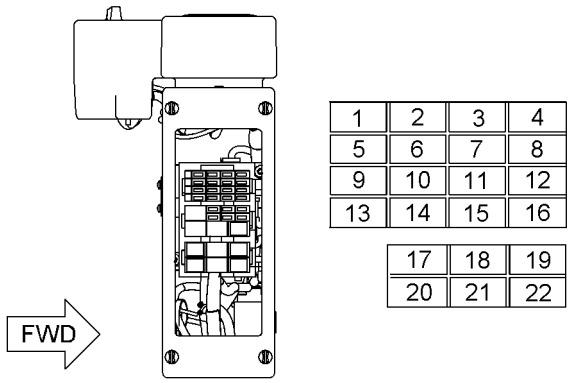


Illustration 167 g01038179

The fuse panel is located inside the cab on the side of the right console.

Fuses protect the electrical system from damage that is caused by overloaded circuits. Replace the fuse if the element separates. If the element of a new fuse separates, check the circuit. Repair the circuit, if necessary.

(1) Lights (Flood) – 15 Amp

(2) Lighter – 10 Amp

(3) Wipers – 10 Amp

(4) Transmission – 10 Amp

(5) Steering – 10 Amp

(6) 24 Volt to 12 Volt Converter – 10 Amp

(7) Starting Aid or Air Seat – 15 Amp

(8) Engine Speed – 10 Amp

(9) Indicator Gauge Group – 10 Amp

(10) Window Defroster (Rear) – 15 Amp

(11) Beacon or Seat Heater – 10 Amp

(12) Joystick – 10 Amp

(13) A/C – 25 Amp

(14) Kickout or Ride Control – 10 Amp

(15) Blower Fan – 15 Amp

(16) Turn Signals – 10 Amp

(17) Stop Lights – 10 Amp

(18) Dome Light or Hour Meter – 10 Amp

(19) Spare – 10 Amp

(20) Horn – 10 Amp

(21) Key – 10 Amp

(22) Spare – 10 Amp

i02005832

Hydraulic System Oil - Change

SMCS Code: 5095-044

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine for a few minutes in order to warm the hydraulic system oil.

2. The machine should be level. Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

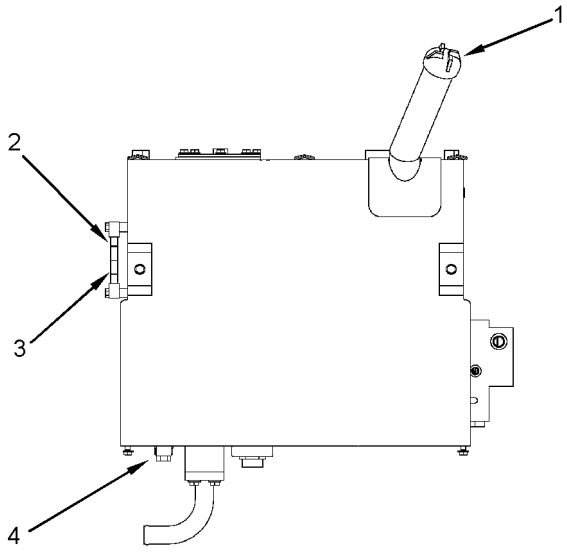


Illustration 168 g01038716

3. Hydraulic tank filler cap (1) is located on the right side of the machine.

4. Remove hydraulic tank filler cap (1).

5. Hydraulic tank drain valve (4) is located at the bottom of the hydraulic tank. Remove the bottom guard in order to access the drain valve. Open the drain valve and allow the hydraulic oil to drain into a suitable container.

6. Close drain valve (4).

7. Fill the hydraulic system oil tank.

Reference: Refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities”.

8. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary. Install the hydraulic tank filler cap.

9. Start the engine and run the engine for a few minutes.

10. Maintain the hydraulic oil level between lines (2) and (3) on the sight gauge. Add oil, if necessary.

Note: The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and hose clamps.

11. Stop the engine.

i02006859

Hydraulic System Oil Level - Check

SMCS Code: 5095-535-FLV

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: Check the hydraulic system oil level with the machine on a level surface.

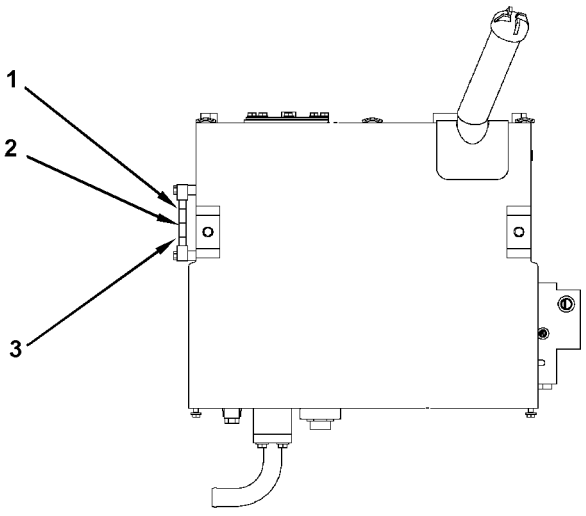


Illustration 169 g01038375

(1) Maximum
(2) Normal
(3) Minimum

1. The sight gauge is located on the right side of the machine. Maintain the hydraulic oil level between lines (1) and (3) on the sight gauge.

2. Remove the hydraulic tank filler cap and add hydraulic oil, if necessary.

i02006885

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008; 5056-008; 7542

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine for a few minutes before obtaining the oil sample. Operate the hydraulic controls. This will thoroughly mix the hydraulic oil for a more accurate sample.

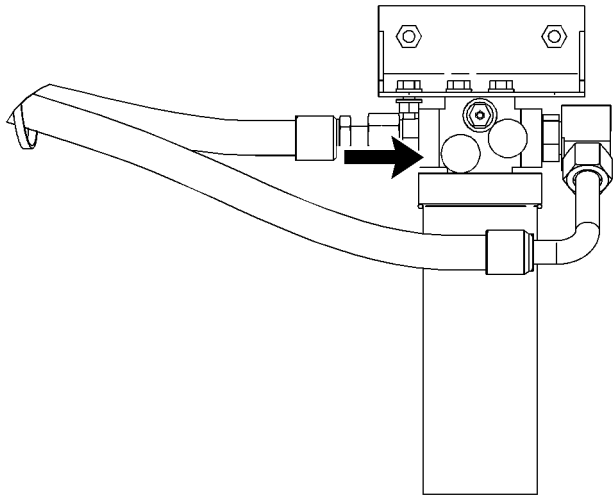


Illustration 170 g01038684

2. Use the sampling valve in order to obtain a sample of the hydraulic oil. The sampling valve is located on the left side of the machine behind the engine compartment.

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i02005329

Hydrostatic Drive Oil - Change

SMCS Code: 4350-044-OC

Illustration 171 g00475532

Allow the machine to cool before you change the hydrostatic drive oil. Oil could spray when you remove the plug.

The hydrostatic drive box is located on the underside of the machine.

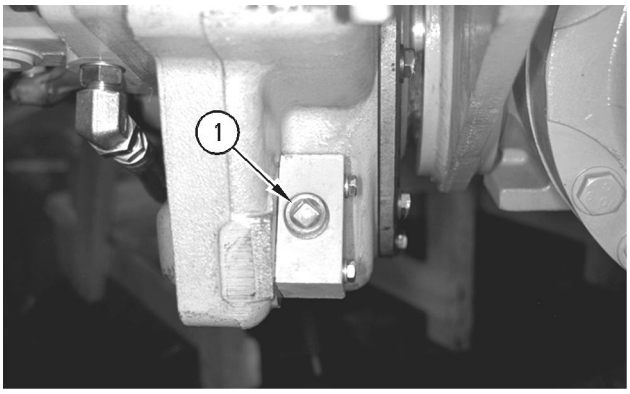


Illustration 172 g00433956

1. Remove oil level/fill plug (1) slowly in order to release pressure.

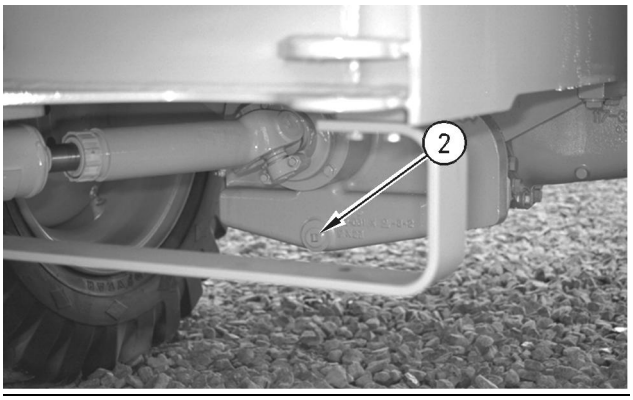


Illustration 173 g00402578

2. Remove drain plug (2) and allow the oil to drain into a suitable container.

3. Clean the drain plug and install the drain plug.

4. Add oil until the oil is level with the bottom of the plug threads.

Reference: For more information, refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities”.

5. Clean the oil level/fill plug and install the oil level/fill plug.

i02005680

Hydrostatic Drive Oil Level - Check

SMCS Code: 4350-535-OC

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Illustration 174 g00402638

The hydrostatic drive box is located on the underside of the machine.

1. Allow the machine to cool before you check the hydrostatic drive oil level. Oil could spray when you remove the plug.

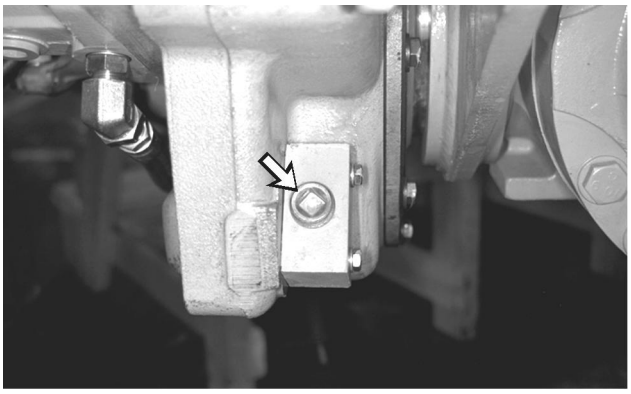


Illustration 175 g00402618

2. Remove the oil level/fill plug slowly in order to release pressure. The oil should be level with the bottom of the plug threads.

3. Add oil, if necessary.

   Reference: For more information, refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities”.

4. Clean the oil level/fill plug and install the oil level/fill plug.

i02005818

Hydrostatic Drive Oil Sample - Obtain

SMCS Code: 4350-008; 7542

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Illustration 176 g00402638

The hydrostatic drive box is located on the underside of the machine.

1. Operate the machine for a few minutes before obtaining the oil sample. This will thoroughly mix the oil for a more accurate sample.

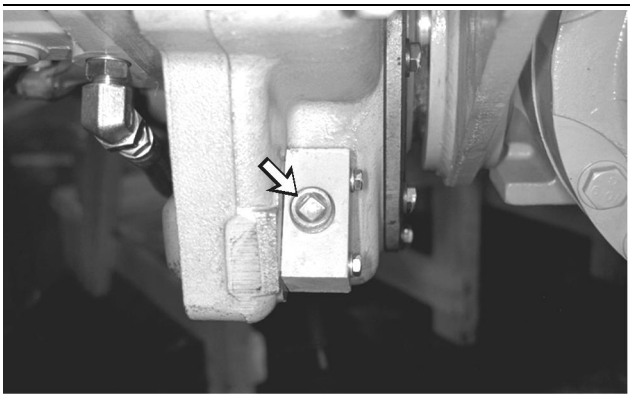


Illustration 177 g00402618

2. Use the fill port in order to obtain a sample of the hydrostatic drive oil.

Note: Remove the oil level/fill plug slowly in order to release pressure.

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

3. Clean the oil level/fill plug and install the oil level/fill plug.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 3004-507

Inspect a Used Filter for Debris

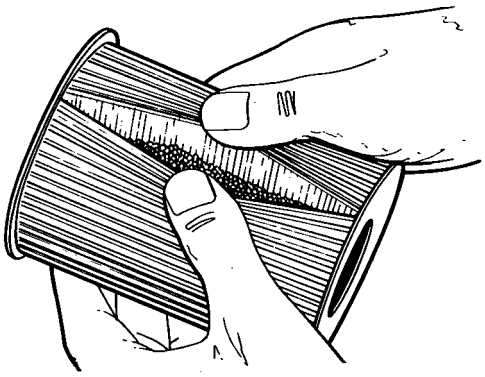


Illustration 178 g00100013

The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i02006806

Power Train Oil Filter - Replace

SMCS Code: 3004-510

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

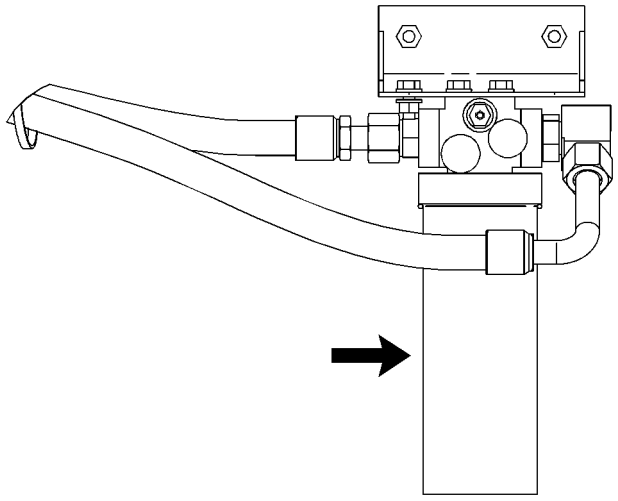


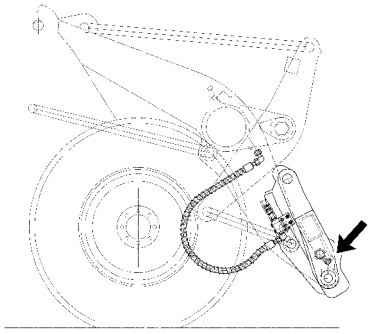
Illustration 179 g01038158

1. The power train oil filter is located on the left side of the machine behind the engine compartment.
2. Remove the oil filter with a strap type wrench.
3. Clean the filter mounting base. Remove any part of the oil filter gasket that remains on the filter mounting base.
4. Apply a light coat of oil to the gasket of the new oil filter.
5. Install the new oil filter by hand. When the gasket contacts the filter mounting base, tighten the oil filter for an additional three quarters of a turn.

i02005661

Quick Coupler - Lubricate

SMCS Code: 6129-086

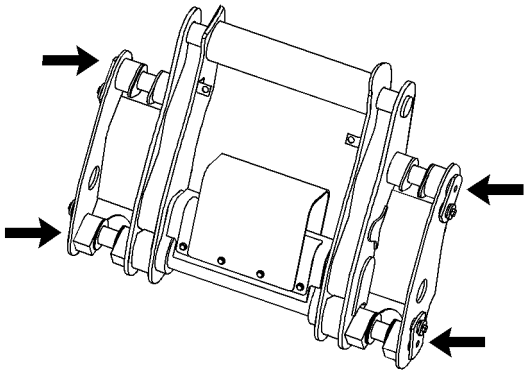


g01037450

Illustration 180

PDF1-Up

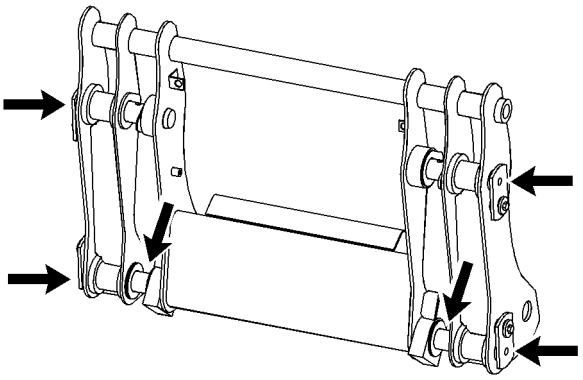
A grease fitting is located on each side of the quick coupler.



g01037452

Illustration 181

FWL1-Up and KZN1-Up



g01037453

Illustration 182

FWL1-Up and KZN1-Up

1. Wipe off all grease fittings before you apply lubricant.
2. Apply lubricant through each fitting.

   Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

i02021513

Radiator Core - Clean

SMCS Code: 1353-070-KO

g00387726

Illustration 183

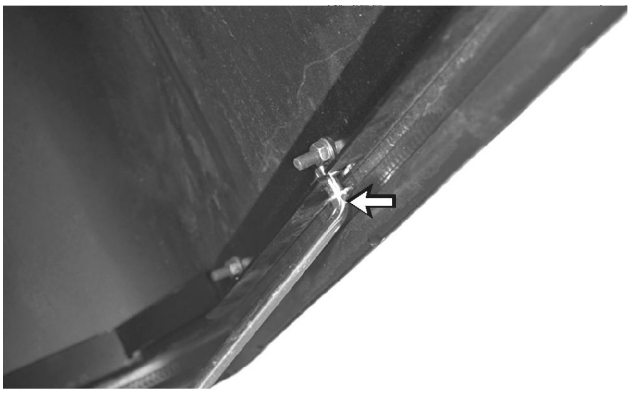


Illustration 184 g00448380

1. Open the engine access door on the back side of the machine. Use the prop rod to hold the engine access door open. The radiator assembly is located on the left side of the engine compartment.

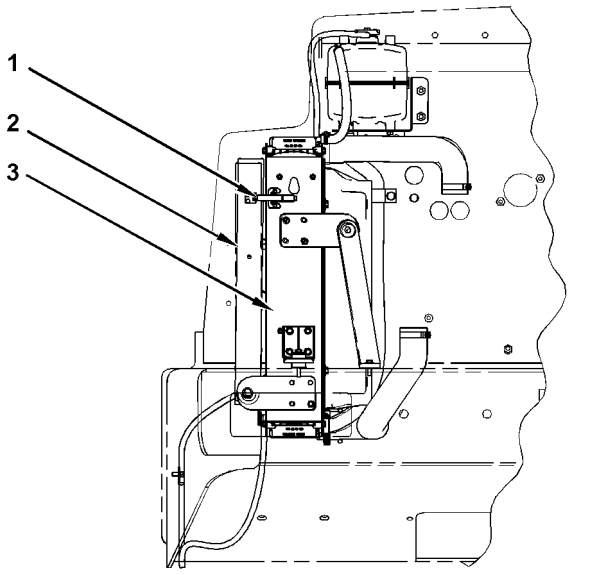


Illustration 185 g01043952

Rear View of the Machine

2. Unlatch two latches (1) for hydraulic oil cooler (2). Swing the hydraulic oil cooler away from radiator (3) in order to clean the radiator and the hydraulic oil cooler.

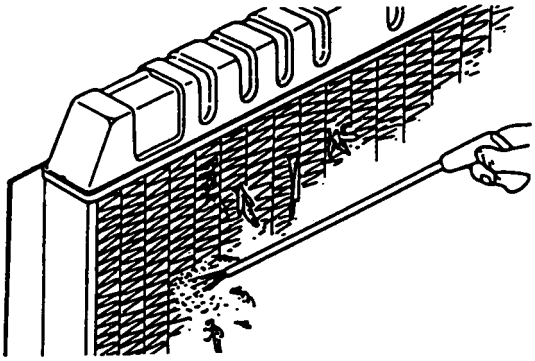


Illustration 186 g00101939

3. You can use compressed air, high pressure water, or steam to remove dust and other debris from the radiator fins. However, the use of compressed air is preferred.

4. Swing the hydraulic oil cooler back into the operating position and latch the two latches.

5. Close the engine access door.

i02005499

Ride Control Accumulator - Check

SMCS Code: 5077-535-R6

When the ride control accumulator is properly charged, the fore and aft motion of the machine is reduced by the ride control accumulator. Special tools and equipment are required in order to test the accumulator.

Reference: For more information, refer to Systems Operation, Testing and Adjusting, RENR6493, “914G Wheel Loader and IT14G Integrated Toolcarrier Hydraulic System”, “Ride Control Accumulator - Test and Charge”.

i02005410

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

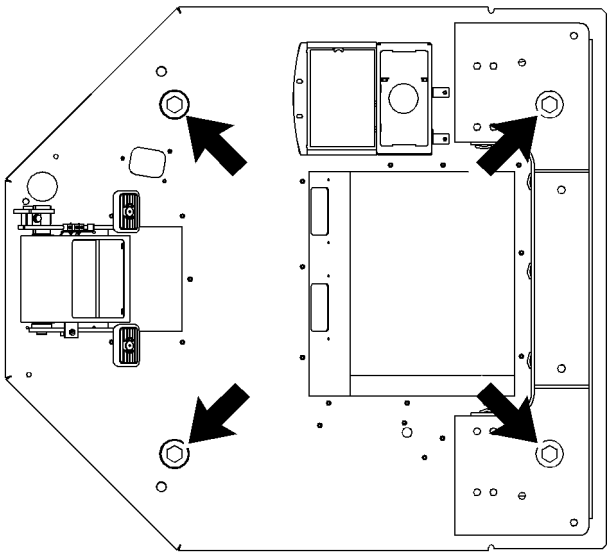


Illustration 187 g01037257

1. Remove the access covers from both sides of the ROPS.

2. Inspect the ROPS for loose bolts or for damaged bolts. Replace any damaged bolts or missing bolts with original equipment parts only.

Note: Apply oil to all ROPS bolt threads before you install the bolts. Failure to apply oil to the bolt threads can result in improper bolt torque.

   Tighten the bolts that hold the platform to the frame to a torque of 530 ± 70 N·m (400 ± 50 lb ft). Tighten the bolts that hold the ROPS to the platform to a torque of 460 ± 60 N·m (340 ± 45 lb ft). Once you have torqued all the bolts, torque the bolts again.

3. Operate the machine on a rough surface. Replace the ROPS mounting supports if the ROPS emits a noise. Replace the ROPS mounting supports if the ROPS rattles.

4. Install the access covers.

Do not straighten the ROPS. Do not repair the ROPS by welding reinforcement plates to the ROPS.

Consult your Caterpillar dealer for repair of cracks in any welds, in any castings, or in any metal section of the ROPS.

i02429589

Seat Belt - Inspect

SMCS Code: 7327-040

Always check the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.

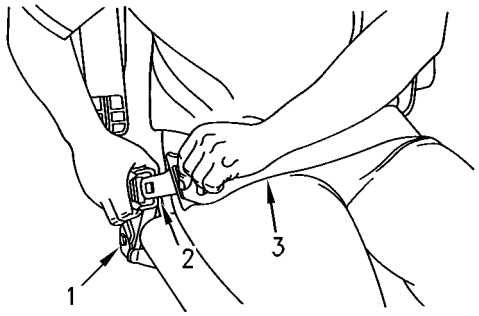


Illustration 188 g00932801

Typical example

Check the seat belt mounting hardware (1) for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

Check buckle (2) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect the seat belt (3) for webbing that is worn or frayed. Replace the seat belt if the seat belt is worn or frayed.

Consult your Caterpillar dealer for the replacement of the seat belt and the mounting hardware.

Note: Within three years of the date of installation or within five years of the date of manufacture, replace the seat belt. Replace the seat belt at the date which occurs first. A date label for determining the age of the seat belt is attached to the seat belt, the seat belt buckle, and the seat belt retractor.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

i02429594

Seat Belt - Replace

SMCS Code: 7327-510

Within three years of the date of installation or within five years of the date of manufacture, replace the seat belt . Replace the seat belt at the date which occurs first. A date label for determining the age of the seat belt is attached to the seat belt, the seat belt buckle, and the seat belt retractor.

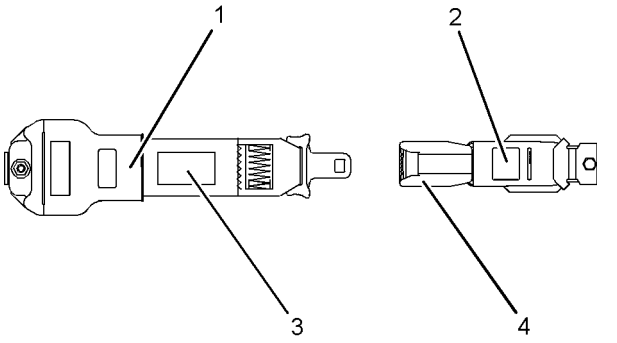


Illustration 189 g01152685

(1) Date of installation (retractor)
(2) Date of installation (buckle)
(3) Date of manufacture (tag) (fully extended web)
(4) Date of manufacture (underside) (buckle)

Consult your Caterpillar dealer for the replacement of the seat belt and the mounting hardware.

If your machine is equipped with a seat belt extension, also perform this replacement procedure for the seat belt extension.

i02005182

Service Brake Disc Wear - Check

SMCS Code: 4255-535

Reference: For information on checking the service brake discs, refer to Systems Operation, Testing and Adjusting, RENR6495, “914G Wheel Loader and IT14G Integrated Toolcarrier Braking System”, “Service Brake Discs - Check”.

i02005450

Steering Cylinder Bearings - Lubricate

SMCS Code: 4303-086-BD

1. Wipe off the grease fittings before you apply any lubricant.

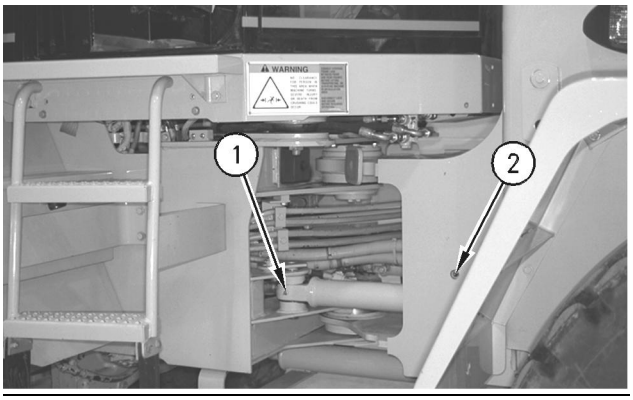


Illustration 190 g00412742

2. Apply lubricant to grease fitting (1) for the head end of the steering cylinder. There is a grease fitting on each side of the machine.

3. Apply lubricant to remote grease fitting (2) for the rod end of the steering cylinder. There is a grease fitting on each side of the machine.

i03589859

Steering Column Play - Check

SMCS Code: 4310-535; 4338-535

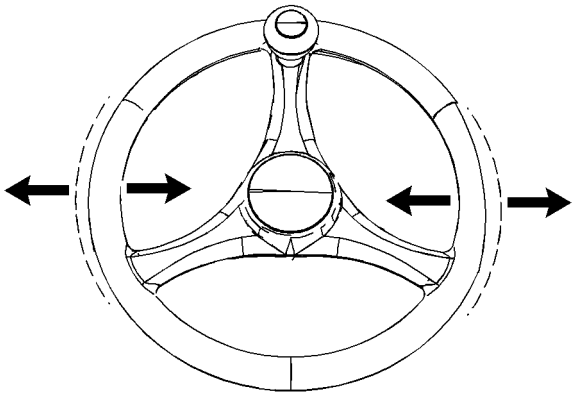


Illustration 191 g01408466

1. Hold the steering wheel with both hands.

2. Try to move the steering wheel from one side to the other side. The maximum allowed movement in the steering column should not exceed 25 mm (1.0 inch). If the value is not within the limit, perform the following steps:

a. Inspect the pivot joint for loose bolts.

b. Tighten the bolts if the bolts are loose.

Note: Apply 9S-3263 Thread Lock Compound to the bolts before tightening.

c. Inspect the pivot joint for excessive wear.

d. Replace the bushings if there is excessive wear.

⚠ WARNING

Failure to perform this inspection and repair may cause loss of steering control, which may result in personal injury or death.

Do not operate the machine until the inspection and repair are completed.

Contact your Caterpillar dealer for any other required service.

i03589938

Steering Column Spline (HMU Steering) - Lubricate

SMCS Code: 4310-086-JF; 4310-086-SN; 4338-086-SN; 4343-086-SN; 4343-086-JF

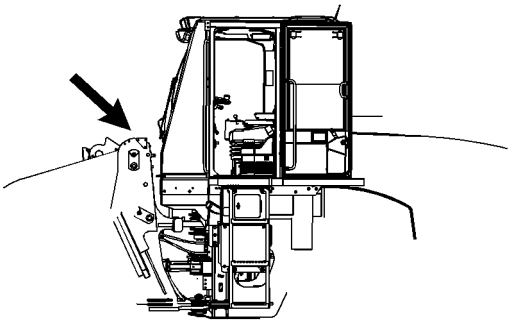


Illustration 192 g01477014

The metering pump is located under the front of the cab.

⚠ WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

When you check the compact wheel loaders, perform the following step first.

- Remove the plastic, cone-shaped nose in order to reach the steering valve (HMU steering).

Refer to Operation and Maintenance Manual, “Steering Frame Lock” before entering the articulation joint.

Note: Do not disconnect any hydraulic lines from the metering pump.

Use the following steps to lubricate the splines on the steering column:

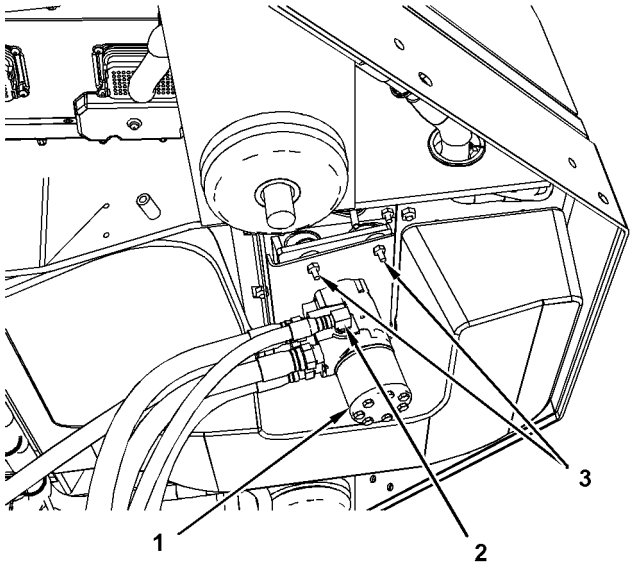


Illustration 193 g01311462

(1) Metering Pump
(2) Hose Coupling
(3) Bolts

1. Support the metering pump (1). Loosen the four bolts (3) that hold the pump. Do not loosen the hose couplings (2).

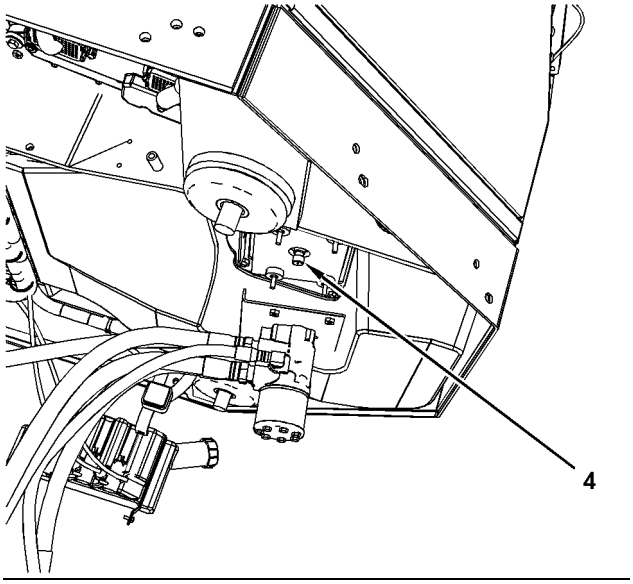


Illustration 194 g01311464

(4) Splines

2. Lower the pump in order to expose the splines (4).

3. Clean the male splines on the steering column. Clean the female splines in the pump.

4. Apply proper grease to the splines. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for selecting the proper grease.

5. Push the pump into position.

6. Tighten the four bolts that hold the pump.

7. Test the steering system.

i02005573

Tire Inflation - Check

SMCS Code: 4203-535-AI

1. Measure the tire pressure on each tire. Consult your Caterpillar dealer for the correct load rating and for the correct operating pressures.

2. Inflate the tires, if necessary.

   Reference: For more information, refer to Operation and Maintenance Manual, “Tire Inflation with Air”.

i01921569

Windows - Clean

SMCS Code: 7310-070

Use commercially available window cleaning solutions in order to clean the windows. Clean the outside windows from the ground unless handholds are available.

Note: Use a damp cloth to clean the windows. Using a dry cloth will damage the surface of the window.

i02009134

Windshield Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE
When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

Illustration 195 g00387726

1. Open the engine access door on the back side of the machine.

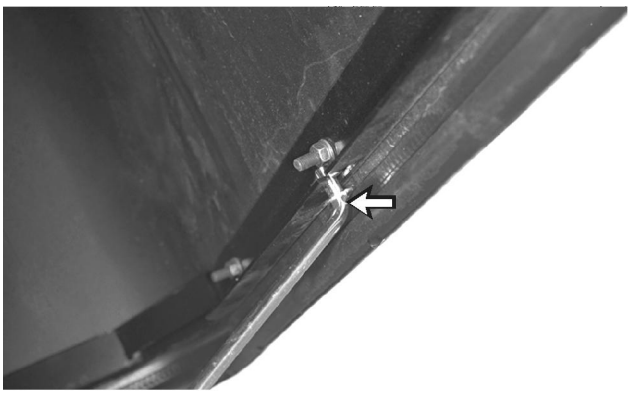


Illustration 196 g00448380

2. Use the prop rod to hold the engine access door open.

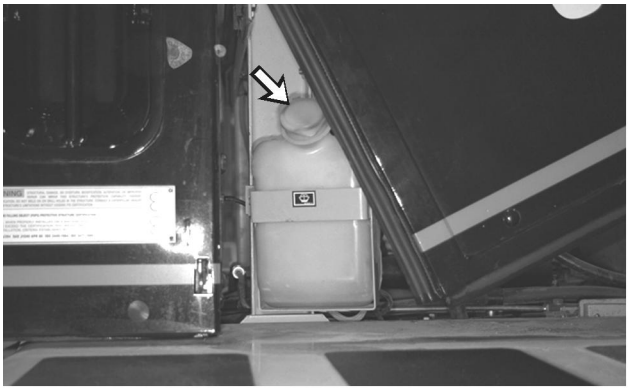


Illustration 197 g00394757

The window washer reservoir is located on the left side of the machine.

3. Fill the reservoir with window washer solvent.

4. Close the engine access door.

i02005598

Windshield Wipers - Inspect/Replace

SMCS Code: 7305-040; 7305-510

1. Inspect the condition of the wiper blades.

2. Replace the wiper blades if the wiper blades are worn or damaged. Replace the wiper blades if streaking occurs.